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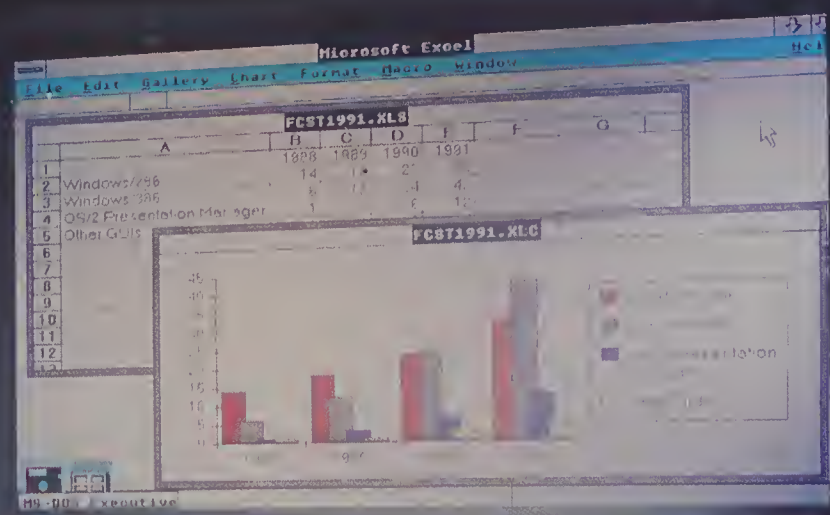

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HOW TO

- INSIDE 1-2-3 MACROS
- SURVIVING HARD DISK DISASTERS
- MORE HOT TIPS!

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OUR SYSTEM 310 IS FASTER THAN A BAT OUT OF HELL.

If you've been looking at 386™-based computers, you obviously feel the need for speed.

Something the Dell System 310 delivers in spades.

In fact, the System 310 has more speed than even the most seasoned 386-users have come to expect. Case in point, PC Labs benchmark tests. The System 310 consistently outperformed the Compaq^ 386/20e. Not to mention the IBM PS/2^ Model 70-121. Leading one reviewer to write, "It's fast enough to burn the sand off a desert floor."

For us, however, fast enough is not enough. By utilizing an Intel^ 82385 Cache Memory Controller, page mode RAM and interleaved memory, the 310 not only delivers the aforementioned speed, but enough horsepower to do everything from CAD/CAM to mega-spreadsheets to databases the size of the Manhattan Yellow Pages.

It even has the umph to work as a network file server.

TELL US WHAT TO DO NEXT.

As much as the System 310 has to offer, it doesn't even begin to reach its full potential until after we've heard your input.

For it's only in this way that we're able to custom configure every 310 system. To give users exactly what they need. No more. No less.

Do you do a lot of spreadsheets? There's an optional Intel 80387 or WEITEK 3167 math coprocessor available.

Storage? You can have a 40 MB hard drive. Or choose a 90, 150, or 322 MB ESDI drive.

The System 310 comes standard with 1 MB of RAM. Want more? We can add as much as 8 MB to the system board.

Still not enough? We can add another 8 MB by installing a high-speed memory expansion board. You can even run your System 310 as either a MS-DOS,® OS/2 or UNIX® system.

The same holds true for monitors. You can choose between VGA mono with paperwhite screen, or VGA Color Plus, for high resolution colors on a larger screen.

The point here is that when you order a System 310, you not only get a 386-based system that's incredibly fast, powerful and versatile, but incredibly personal as well.

YOU CAN'T GET MORE DIRECT THAN THIS.

There are two times when it can be pure hell to deal with a computer retailer.

When you're trying to buy a new computer. And after you buy a new computer.

Because in all honesty, most computer retailers know more about margins and markups than they do about memory and monitors. So getting the advice you need isn't always easy.

Getting after-the-sale service isn't always easy either.

But when you buy from us, you

never set foot in a computer store.

Instead, you deal direct. You talk with a computer expert who can offer sound advice. Someone who can help you configure a system that not only meets your needs, but meets them for about 35% less than you'd pay a retailer.

WE COME WHEN WE'RE CALLED.

One of the things that very clearly sets a Dell system apart from other computers is not just how they're sold but how they're supported.

Overkill was one description used in a PC Week article.

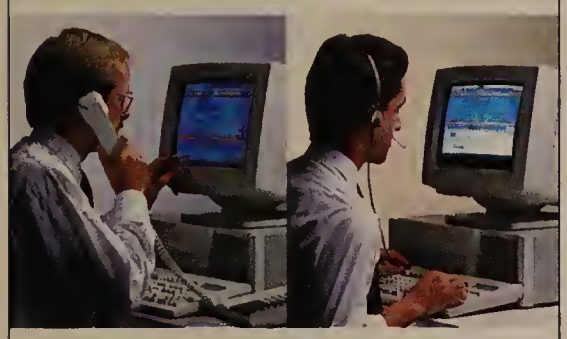
Perhaps. But then, we think you'll agree, when something goes wrong, you want all the help you can get, right?

Which is why every Dell system comes with self-diagnostic software and a toll-free technical support line. We're able to solve 90% of all problems right over the phone.

The other 10% receive next-day, deskside service. Thanks to our new alliance with Xerox Corporation.

And you get all this help for a full year—whenever you need it—at no extra charge.△

As you've probably guessed by now, one of the things that drives us most is customer satisfaction.



So we'd like to give you the ultimate guarantee: Try a System 310 in your office for a month. Run your toughest applications. Put it through its paces, at your pace. If you're not completely satisfied, send it back anytime within 30 days. And we'll refund your money. No questions asked.

AND YOU DON'T HAVE TO GO THERE TO BUY IT.

MAYBE YOU SHOULDN'T BUY ONE AFTER ALL.

No matter how many reasons we give you to buy a Dell system, sometimes it makes more sense to lease one instead. Whether you need a single computer, or an entire office full, leasing is just like 100% financing. So you don't tie up working capital. Or credit lines. Of course, there can also be tax advantages as well.

And just as we can custom configure your computers, we can see to it you get a custom designed lease plan to fit the exact needs of your business.†

It's just another example of why over half the Fortune 500 companies now own or lease Dell systems.

And why you may decide that from now on, the only place you'll ever go to buy a computer, is to the phone on your desk.

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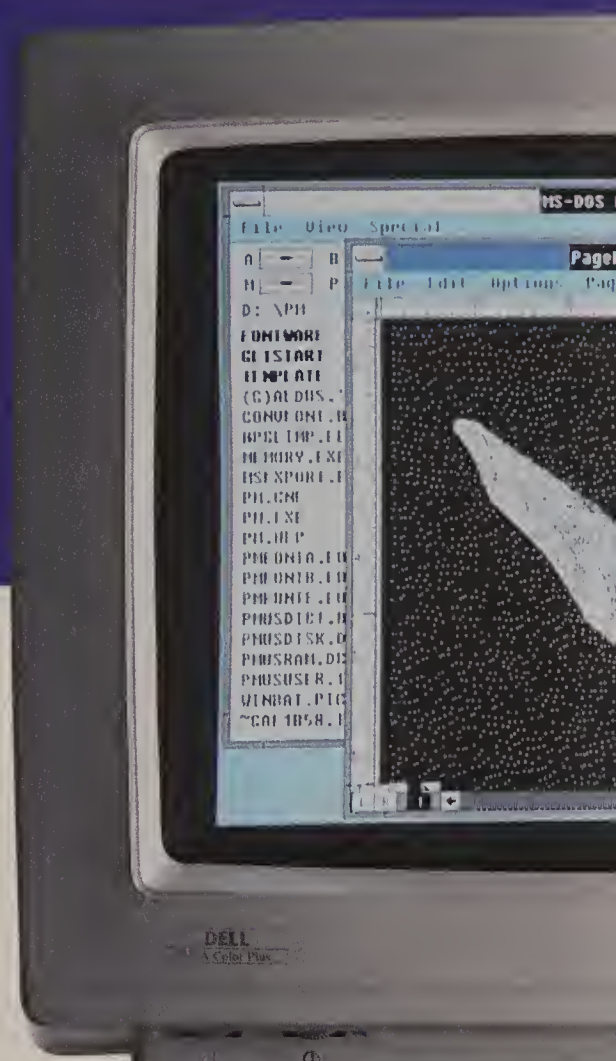
Printer System 800: $699.95.
Our highest resolution text and graphics, 24-pin dot matrix printer. Draft quality at 200 cps. Letter quality at 66 cps. Parallel and serial interfaces. Wide carriage.

Printer System 600: $499.95.
9-pin dot matrix. Draft quality at 240 cps. Near-letter quality at 60 cps. Parallel interface. Wide carriage.

Printer System 300: $199.95.
9-pin dot matrix. Draft quality at 144 cps. Near-letter quality at 36 cps. Four standard fonts. Parallel interface. Narrow carriage.

SO HOW COME YOU NEVER CALL?



THE DELL SYSTEM 310 20 MHz 386.

PC MAGAZINE EDITOR'S CHOICE

"You will have to look far and wide to find a better price-performance package for the power user that is lurking inside you."
November 29, 1988

STANDARD FEATURES:

- Intel 80386 microprocessor running at 20 MHz.
- Choice of 1 MB or 4 MB of RAM* expandable to 16 MB using a dedicated high speed 32-bit memory slot.
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 20 MHz Intel 80387 or 20 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

OPTIONS:

- 20 MHz Intel 80387 math coprocessor.
- 20 MHz WEITEK 3167 math coprocessor.
- 1 MB or 4 MB RAM upgrade kit.
- 2 MB or 8 MB memory expansion board kit.

***Lease for as low as $141/Month.*

System 310	With Monitor & Adapter			
	VGA Mono		VGA Color Plus	
Hard Disk Drives	1 MB RAM	4 MB RAM	1 MB RAM	4 MB RAM
40 MB-28 ms	$3,899	$5,199	$4,199	$5,499
90 MB-18 ms ESDI	$4,399	$5,699	$4,699	$5,999
150 MB-18 ms ESDI	$4,899	$6,199	$5,199	$6,499
322 MB-18 ms ESDI	$5,699	$6,999	$5,999	$7,299

DISCLAIMER: All systems are photographed with optional extras, which some computer retailers won't even recognize.

LASER PRINTERS.

Laser System 150, 15 pages per minute: $5,995.
Laser System 80, 8 pages per minute: $3,295.
Laser System 60, 6 pages per minute: $2,195.

All Dell laser printers come with 1.5 MB RAM, full-page 300 DPI graphics, and have 31 standard fonts (7 resident and 24 downloadable from diskette). Dell laser printers also provide Hewlett-Packard LaserJet Plus,^ Epson/FX,^ IBM Proprinter^ and Diablo 630^ emulations.

THE DELL SYSTEM 325
25 MHz 386.

When you need the highest-performance 386 computer, this is it.

STANDARD FEATURES:

- Intel 80386 microprocessor running at 25 MHz.
- Choice of 1 MB or 4 MB of RAM* expandable to 16 MB using a dedicated high speed 32-bit memory slot.
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 25 MHz Intel 80387 or 25 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

OPTIONS:

- 25 MHz Intel 80387 math coprocessor.
- 25 MHz WEITEK 3167 math coprocessor.
- 1 MB or 4 MB RAM upgrade kit.
- 2 MB or 8 MB memory expansion board kit.

***Lease for as low as $216/Month.*

System 325	With Monitor & Adapter			
Hard Disk Drives	VGA Mono		VGA Color Plus	
	1 MB RAM	4 MB RAM	1 MB RAM	4 MB RAM
90 MB-18 ms ESDI	$5,999	$7,299	$6,299	$7,599
150 MB-18 ms ESDI	$6,499	$7,799	$6,799	$8,099
322 MB-18 ms ESDI	$7,299	$8,599	$7,599	$8,899

THE DELL SYSTEM 220
20 MHz 286.

It's fast as most 386 computers. But at less than half the price. The footprint is small, too.

STANDARD FEATURES:

- 80286 microprocessor running at 20 MHz.
- 1 MB of RAM* expandable to 16 MB (8 MB on system board).
- Page mode interleaved memory architecture.
- LIM 4.0 support for memory over 1 MB.
- Integrated diskette and VGA video controller on system board.
- Socket for Intel 80287 math coprocessor.
- One 3.5" 1.44 MB diskette drive.
- Integrated high performance hard disk interface on system board.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports (integrated on system board).
- 3 full-sized industry standard expansion slots available.

OPTIONS:

- External 5.25" 1.2 MB diskette drive.
- 3.5" 1.44 MB diskette drive.
- Intel 80287 math coprocessor.
- 1 MB or 4 MB RAM upgrade kit.

***Lease for as low as $86/Month*

System 220	With Monitor	
Hard Disk Drives	VGA Mono	VGA Color Plus
One Diskette Drive	$2,299	$2,599
40 MB-29 ms Hard Disk	$2,999	$3,299
100 MB-29 ms Hard Disk	$3,599	$3,899

THE DELL SYSTEM 200
12.5 MHz 286.

This full-featured 286 computer runs at 12.5 MHz, and is completely Microsoft MS-DOS and MS OS/2 compatible.

STANDARD FEATURES:

- 80286 microprocessor running at 12.5 MHz.
- 640 KB of RAM expandable to 16 MB (4.6 MB on system board).
- Socket for Intel 80287 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 6 industry standard expansion slots.

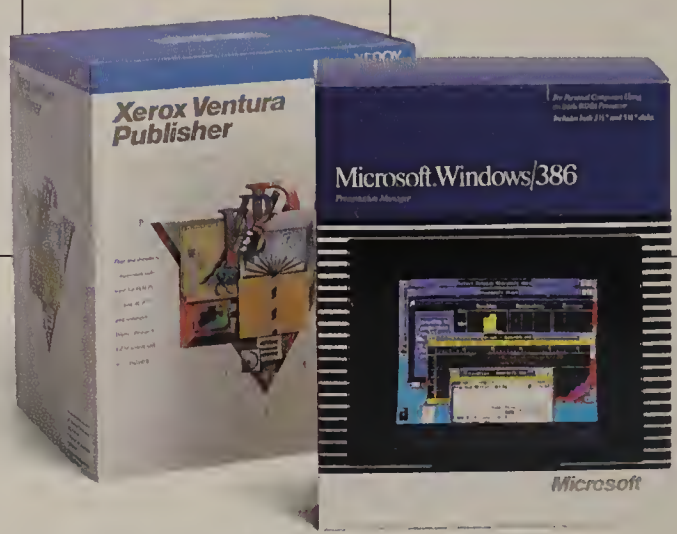
OPTIONS:

- Intel 80287 math coprocessor.
- 512 KB RAM upgrade kit.
- 2 MB RAM upgrade kit.

***Lease for as low as $93/Month.*

System 200	With Monitor & Adapter	
Hard Disk Drives	VGA Mono	VGA Color Plus
40 MB-40 ms	$2,499	$2,799
40 MB-28 ms	$2,699	$2,999
90 MB-18 ms ESDI	$3,199	$3,499
150 MB-18 ms ESDI	$3,699	$3,999
322 MB-18 ms ESDI	$4,499	$4,799

****Performance enhancements (Systems 325, 310 and 220): Within the first megabyte of memory, 384 KB of memory is reserved for use by the system to enhance performance.***



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Dell Enhanced MS® OS/2 Standard Edition 1.0: $324.95.
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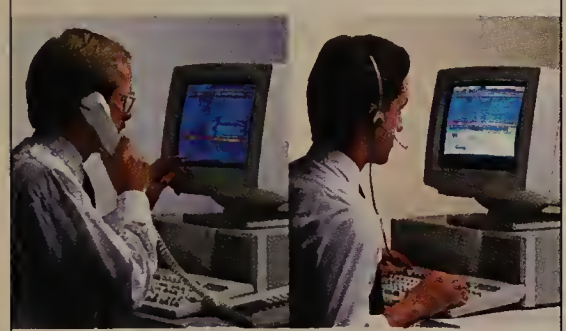

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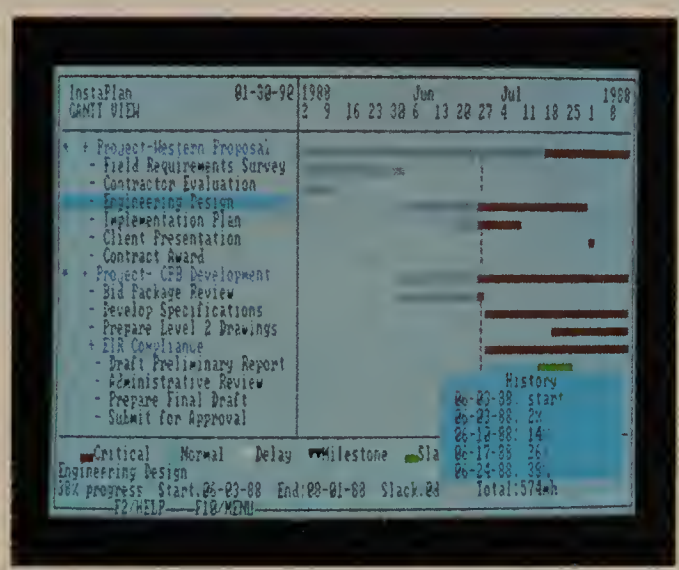

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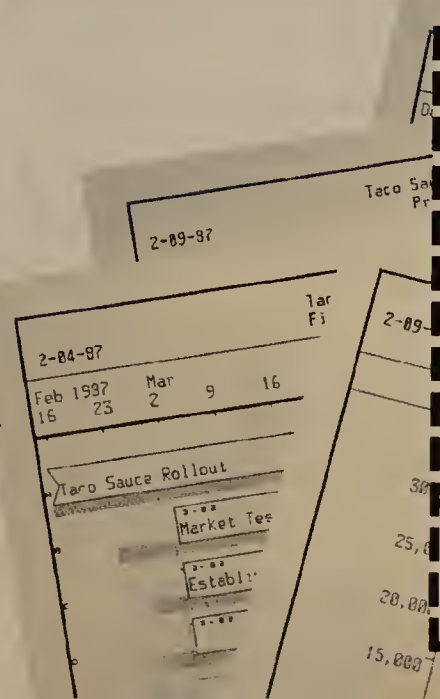

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PCW 5/16

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A Question of Balance

ROBERT CARDIN

Reviewer Alan Schwartz

What separates a master chef from a short-order cook is not the ingredients they use—it's a sense of proportion. A pinch of salt brings out the subtle flavor in a dish; add a handful and your dinner's ruined.

That same sense of delicate balance is essential in software reviewing as well. Every *PC World* review starts with the same ingredients. We compare a program's features with those of its main competitors, pore over NSTL test results, and cast a critical eye on the user interface. Balancing those three elements is what makes the review process as much an art as it is a science.

In this month's roundup of *dBASE* clones ("Five Against IV"), finding the right proportions was hardly a problem. In data management, reports author Alan Schwartz, speed is the name of the game. "Users *really* care about performance," he says. "They seem to find all sorts of ingenious ways to circumvent 'user unfriendliness,' but nothing can overcome sludgy execution." *Foxbase +* earned a Best Buy recommendation thanks to its lightning-fast NSTL test performance and flawless *dBASE* compatibility.

But is *Foxbase* too compatible? Ashton-Tate's copyright-infringement suit against Fox Software made headlines and inspired loud cries of foul from the enormous *dBASE* users' community. Schwartz, a longtime *dBASE* developer and the author of our roundup, finds it ironic that Ashton-Tate should sue.

Actually, he argues, "the clone competition helped solidify *dBASE* as a standard." And by preannouncing *dBASE IV*, he suggests, the giant may have inadvertently encouraged even more blatant cloning. "The competition had to throttle their urge to innovate, frozen by a dilemma: If they offered extensions and innovation, they would risk being trapped into incompatibilities. Whatever the outcome, it's clear that Ashton-Tate's power to define has become the power to redefine."

Also in this issue: John Diebold ("Portable Power") examines eight AC-powered transportable PCs that let you pack desktop computing muscle with your carry-on luggage. The latest generation of 16-bit VGA boards offer superb performance and a host of extended display modes; the details are in Contributing Editor TJ Byers' review "VGA Boards Raise the Standard." And if you don't like the *Windows* interface, change it. Judy Getts ("Windows Made Over") says corporate America is doing just that, thanks to a raft of third-party enhancements. You'll find her feature, plus a whole lot more, in our latest *Windows* Special Report. ●

Ed Bott

Ed Bott
Managing Editor

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McCoy.

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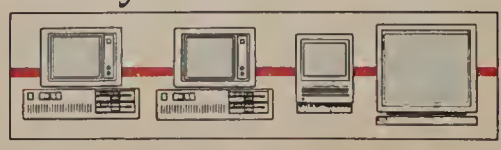

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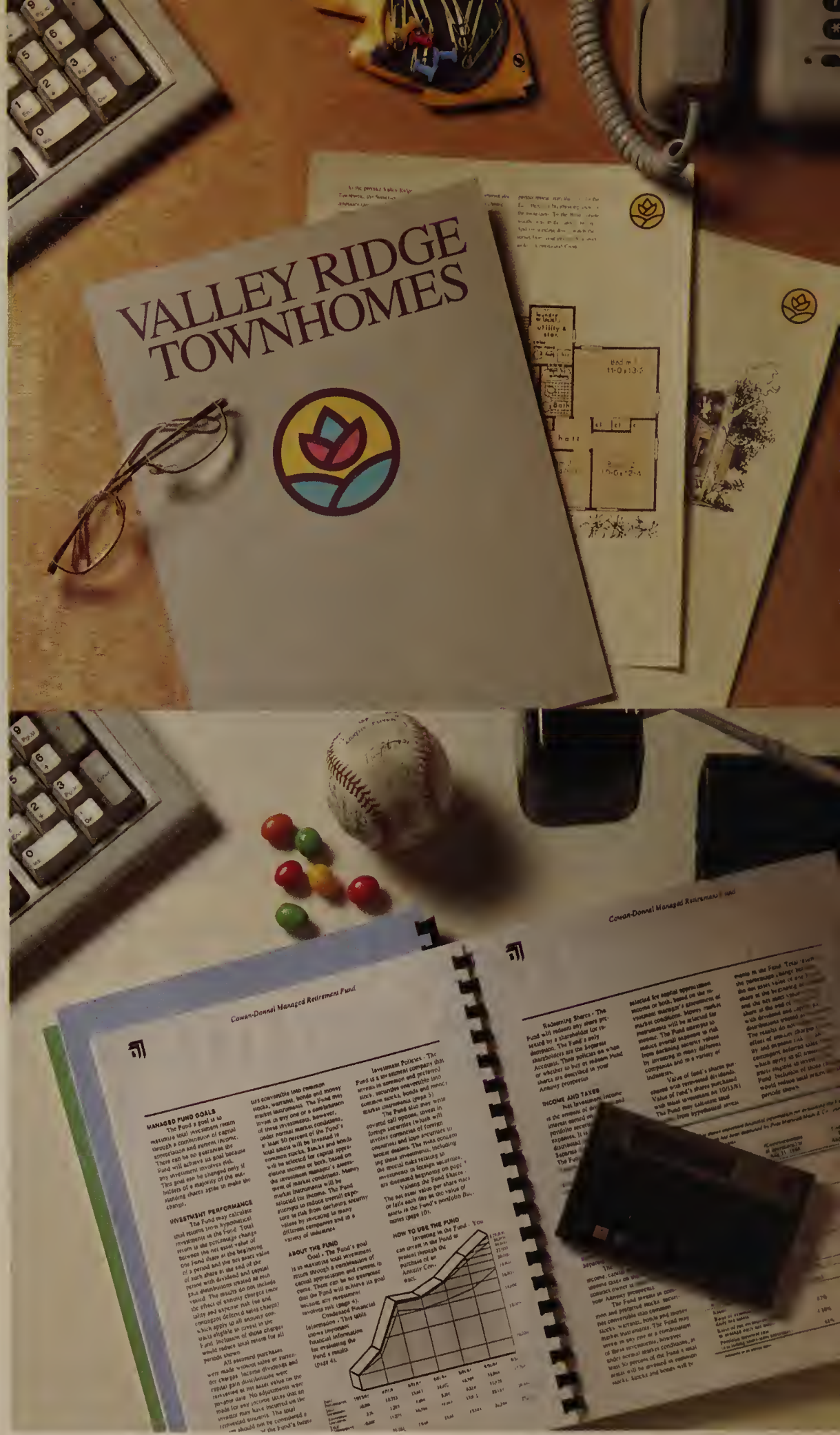

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Leading Edge Enters Chapter 11

Supplier Plunged Into Legal Morass

After laying off almost all its 200 employees and suspending PC shipments and user support for two months, Leading Edge Hardware Products is trying to reorganize under Chapter 11 of the Federal Bankruptcy Code. At press time, court-appointed trustee Stephen Gray had asked the court to accept an offer from Reprise Capital of Garden City, New York, to finance the firm's operations. Reprise's ultimate goal, says Gray, is to take over the Canton, Massachusetts, company, whose major assets are its popular brand name and a disputed right to exclusive U.S. distribution of PCs built by Daewoo Telecom. Leading Edge was thrown into Chapter 11 in February by a half-dozen resellers, who objected to founder Michael Shane's planned transfer of those assets to one of his largest dealer/distributors, PC Systems of Riviera Beach, Florida, in return for $921,000 and the assumption of dealer liabilities. Instead, the disgruntled resellers, who were forced to pay Leading Edge tens of thousands of dollars months in advance of computer shipments, pulled the plug on the company. Leading Edge shipped somewhere around $125 million in PCs last year and may owe creditors as much as $42 million, depending on the disposition of court cases and the disputed ownership of $15 million to $17 million worth of Daewoo systems sitting in a Los Angeles warehouse. Gray has sought court injunctions to enforce the distribution agreement, which Daewoo says Leading Edge voided, and to prevent PC Systems from competing for Leading Edge dealers.

Intel Unveils 80486

Hybrid Chip Offers More Power and a Workstation Alternative

Intel Corporation extended the life of its popular processor family and struck a blow against competing reduced instruction set computer (RISC) suppliers by announcing shipments of its 80486 processor on April 10. The million-transistor chip is a hybrid of Intel's current CPU design and RISC processor technology, yielding throughput two to three times that of 386 chips running at the same 25-MHz and 33-MHz clock rates, reports Claude Leglise, director of 486 marketing. The 486 maintains binary compatibility with all operating modes, operating systems, and applications for the 386. It boosts performance through a combination of limited RISC processing techniques, an on-chip 8K memory cache, and the integration of floating-point computation formerly performed by coprocessors. In addition, the 486 includes an instruction set designed to better support multiprocessor systems such as Zenith Data Systems' Z-1000. Two or more 486s can be more easily coordinated by the appropriate operating system calls anticipated in future versions of OS/2 and UNIX. The 486 not only responds to challenges to Intel's processor hegemony from RISC-chip makers Sun and Motorola, it also gives PC vendors a better platform from which to compete with minicomputers and technical workstations in computation speed and input/output capacity.

33-MHz Systems Arrive

COMDEX Rife With Faster 80386 Machines and Rumors of More

In an unusual round of COMDEX press conferences on April 10, Everex Systems, AST Research, Zenith Data Systems, and Advanced Logic Resources all beat Compaq Computer to the punch by introducing 80386 PCs running at 33 MHz. It's still unclear how many of the machines will hit dealer shelves before the widely rumored Compaq 33-MHz system does. The new systems will not only boost PC speeds another 33 to 38 percent, observes Everex computer product manager Stephen Dougherty, they'll also let their vendors push even deeper into markets now dominated by minicomputers. The Step 386/33, scheduled to ship by the end of April, will perform at 8.2 MIPS thanks to Everex's proprietary 256K read/write cache. AST began designing its Premium 386/33 back when it was preparing the Premium 386/25, reveals Larry Fortmuller, director of computer products. To save development time, both systems were designed with plug-in (but not interchangeable) CPU cards that house various coprocessors, 4MB of system memory, and 32K of cache memory. They also contain motherboards with integrated disk controllers and I/O ports. Similarly, Zenith began to design its Z-386/33 at the same time as the Z-386/25, but a new proprietary cache combines with the faster processor to boost the Z-386/33's speed to 8.3 MIPS, 38 percent faster than the Z-386/25. Details on ALR's scheduled 33-MHz model were not finalized at press time. Even the high-end systems are priced below $12,000, and most should ship by May.

Compaq, Businessland Split

Battle Between Compaq and IBM Spills Over Into Dealer Channel

The $150-million-a-year distribution agreement between Compaq Computer and Businessland ends on April 21 in a divorce unusual for its suddenness and acrimony. Compaq broke off the partnership in a February 20 meeting between the two firms' top executives, stating that it is tired of resisting Businessland pressure for unfair margin advantage over other dealers. Businessland claims that it was merely seeking help in defraying its $20 million yearly technical training and support bill—help that Businessland is able to elicit from other vendors, according to Communications Manager Beverley Bird. Complicating the issue is the stepped-up competition between Compaq and IBM for industry leadership, exemplified by the Extended Industry Standard Architecture challenge to IBM's Micro Channel. Compaq's objection to support funds is only a "smoke screen," asserts Bird. "What caused the fuss is that we have put a lot of support behind the Micro Channel." That was "the effect, not the cause," retorts Mike Swavely, Compaq vice president of sales and marketing. He maintains that Businessland's high-overhead storefronts and lowball prices force it to seek special treatment from vendors. Swavely feels that a sweetheart deal between Businessland and IBM prompts the reseller to push Big Blue's hardware over Compaq's. IBM recently changed its reimbursement policy, which could increase pressure on dealers to give preference to IBM products. Both Businessland and Compaq vow that Businessland customers will continue to receive support for their Compaq hardware, but the two firms have not reached agreement over implementation.

PC Paintbrush IV Coming

Best-Seller's Interface Now Resembles Windows and PM

Z-Soft will release in May the fourth edition of its popular PC paint program, this one with an interface more closely resembling that of *Windows* and the OS/2 Presentation Manager. With *PC Paintbrush IV*, the Marietta, Georgia, firm replaces the proprietary interface known to approximately 1.5 million users with one that President Mark Zachmann calls "99 percent compatible" with IBM's Common User Access standard. "Our research shows that we can cut training time by a factor of five for people used to running *Windows* or PM," notes Zachmann. "That's what standards are all about." While *PC Paintbrush IV* is not a *Windows* or PM application, its similar pulldown menus and dialog boxes will help even occasional users navigate the program more quickly. Version IV offers the ability to retouch scanned-in photographs by manipulating image brightness, contrast, and tints—helping desktop publishers create electronic halftones. Among other enhancements are gradient color control for displaying a range of shades within an object, and tiling for creating patterns and textures. The new product has greater zoom capabilities and refreshes the screen about twice as fast as old versions, Zachmann claims. It will carry a $99.95 price tag, $5 higher than *PC Paintbrush 3.75*, released a year ago.

Fax/Modem Debuts

Quadram's Combo Turns Up the Heat on Communications Market

Hoping to garner a still larger share of the exploding market for facsimile products, Quadram will ship an aggressively priced combination modem/facsimile board by the end of April. The JT Fax Pro96 includes a 2400-bps modem and a 9600-bps group III fax system for $495. This is well below the prices of its major competitors—Intel PCEO's $1290 Connection CoProcessor and The Complete PC's $899 Complete Communicator. Quadram increases component integration and cuts costs by combining new Rockwell Smartmodem and fax chipsets. Although the product supports the DCA/Intel Communicating Applications Specification for sending faxes from within non-communications applications, Quadram expects most customers to use the JT Fax Pro96's extension of the Hayes AT modem command set to send both faxes and data via popular communications packages. A memory-resident file-capture utility can be programmed to simultaneously send a file in ASCII, binary, and fax formats. The JT Fax Pro96 incorporates a 6502 coprocessor for background communications processing, but it is backed up by far less memory (16K) than the Intel product, which could mean interruptions for foreground applications. Despite Quadram's commanding 31 percent share of the PC fax-only market, Jan Ozer, Quadram general manager, says that fax providers have to migrate to the faster growing fax/modem market or risk being "leap-frogged." ●

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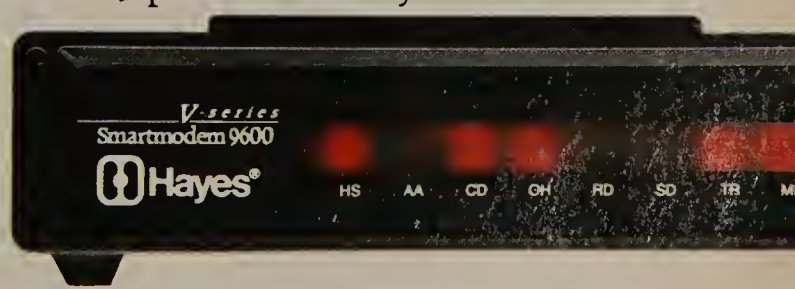

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Circle 343 on reader service card

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To all those unlucky enough to be stuck smack in the middle of the current spreadsheet confusion, take heart.

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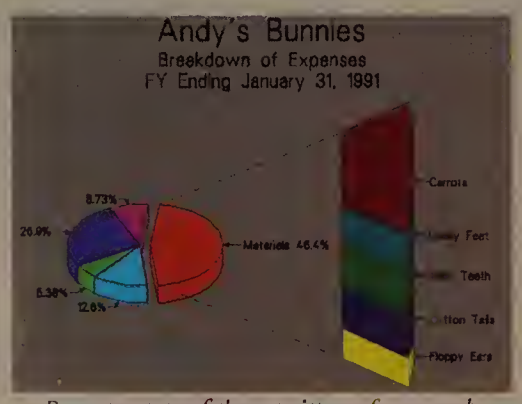

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Unaudited

	This Year	Last Year
Revenue:		
Sales		
Live	$5,778,453	$4,089,672
Dressed	$1,444,775	$677,113
Sales Discounts	($434,990)	($479,124)
Rent-a-Rabbit Fees	$679,991	$324,557
	$7,468,229	$4,612,218
Cost of Sales:		
Opening Inventory	$9,662,351	$5,676,712
Purchases	$109,814	$4,229,164
Freight In	$56,727	$43,242
	$9,828,892	$9,949,118
Ending Inventory	$7,334,110	$9,662,351
Cost of materials	$2,494,782	$286,767
Direct labor	$1,447,951	$1,677,243
Employee benefits	$289,590	$335,449
Ranch supplies	$679,444	$610,442
Total Cost of Sales	$4,911,767	$2,909,901
Gross Profit	$2,556,462	$1,702,317
Less selling, general and admin expenses	$469,887	$490,774
Earnings (loss) from operations	$2,086,575	$1,211,543
Other income and expense:		
Interest Income	$11,309	$9,765
Other income	$17,899	$15,666
Gain (loss) on sale of fixed assets	($379)	$0
	$28,829	$25,431
Provision for income taxes:		
Current income taxes	$1,043,287	$605,772
Deferred income taxes	$0	$0
	$1,043,287	$605,772
Net earnings (loss) for period	$1,043,287	$605,772

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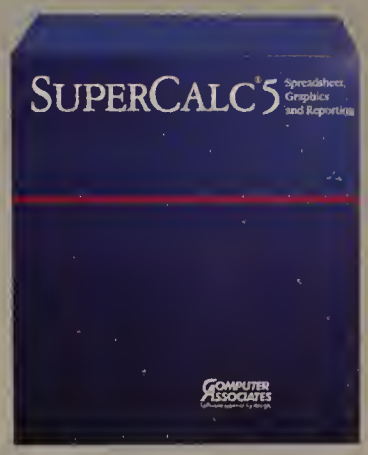

Which finally brings us to our admittedly biased outlook for the much touted spreadsheet war.

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Richard Landry

ROBERT CARDIN

Software That Supports Itself

An oxymoron? Or an idea whose time has come?

Let's get more than rising costs from the next generation of hardware and software.

Every time I speak at a user group meeting, somebody invariably asks me what new features will appear in future versions of his or her favorite word processor, spreadsheet, or data base program. Then, without skipping a beat, somebody else complains that software companies seem intent on producing programs that only get more complicated with each successive version.

User confusion? Vendor bashing from folks who want it all? Neither. Though such attitudes seem contradictory, they actually drive home the same point: Despite the years of training and loads of money that users have invested in program updates and hot new hardware, software still doesn't do what people want it to do. And the more complicated it gets, the less it improves everyone's overall productivity.

This little dose of user reality demolishes the "killer app" theory that's so popular among pundits and other industry types. According to the theory, OS/2 will catch on when users walk into their local software stores and spot a program that's more powerful and exciting than anything they've seen before. They won't just want that program—they'll die for it. Only problem: It says "requires OS/2" on the box. Suddenly, any doubts and misgivings they might have had about this next-generation operating system will magically disappear. They'll plunk down their hard-earned cash for the "killer app"—and for OS/2.

Well, judging by the low sales reported for OS/2 and for the few existing applications that support it, not too many people are on the trail of the "killer app." In fact, I suspect that most of us would be satisfied by software that uses the power of new hardware and software platforms to decrease the complexity that's crept into personal computing, not raise it to new heights. But frankly, even if OS/2 delivers on its ease of use promise, that just won't be enough to justify the costs of 386 technology, graphic interfaces, and large, memory-hungry applications.

Large and small companies alike need software that furthers their business objectives—better customer service, tighter inventory control, shorter product cycles, more effective client presentations. Even if software gets easier to use, it should also help people perform their jobs in a more expert fashion. I don't mean fancy expert systems. But there's no reason users should have to learn desktop-publishing jargon to be able to turn out polished reports. Software must begin shouldering the training and support burden that its growing complexity has created. That is, software should support itself.

A few years ago, a Florida construction firm sued Lotus over an alleged *Symphony* bug that the company claimed caused it to miscalculate a bid and thus lose $250,000. Lotus, of course, claimed that the firm made an error in its worksheet. (The case never made it to court.) Nowadays, that same firm might turn to *1-2-3 Small Business Kit* for bulletproof spreadsheet models—if one of those templates fit its particular problem. Still, no spreadsheet exists that helps a user build a reliable, intelligent worksheet from the ground up, or spot trends that may not be apparent in the numbers.

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(continues)

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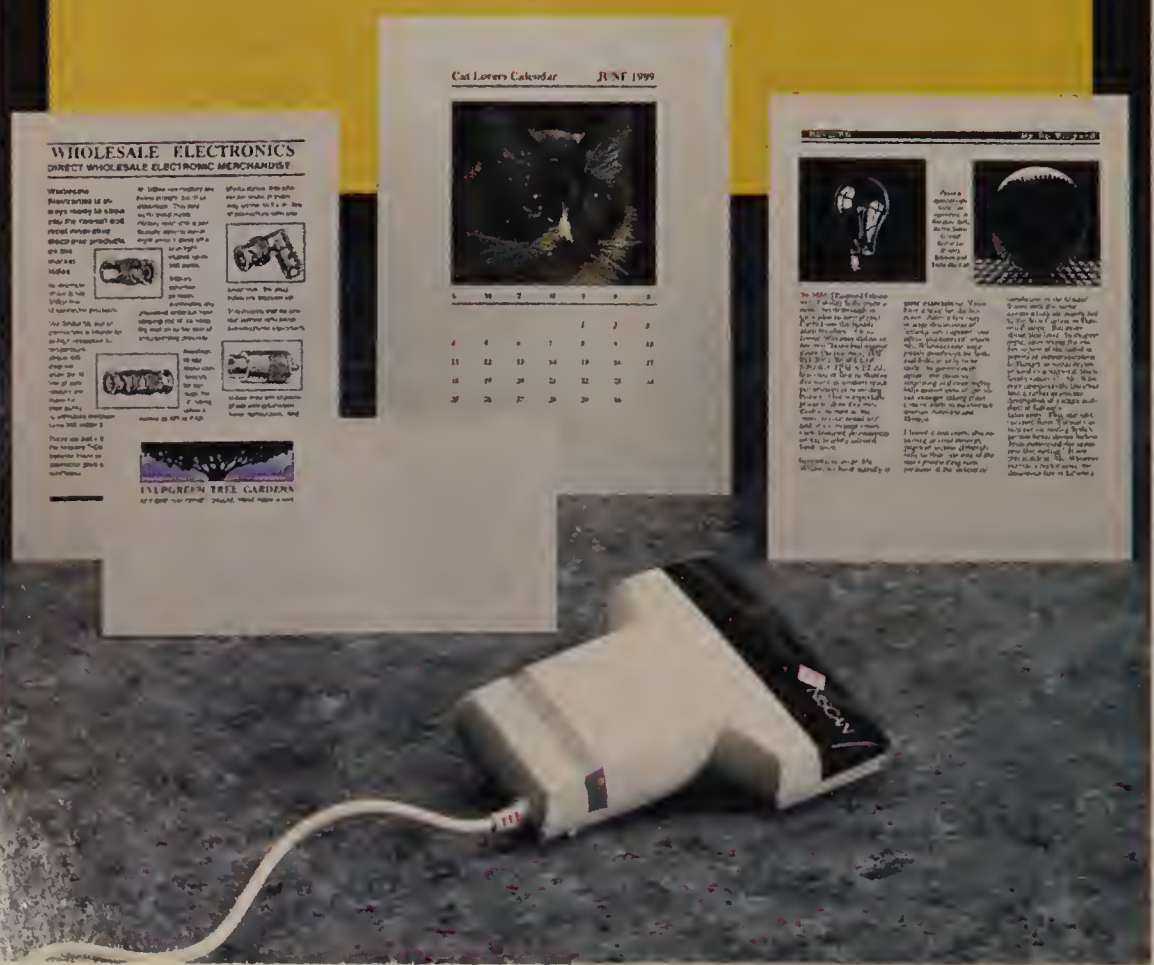

Circle 189 on reader service card

offer—expertise, not just efficiency. Software that's simpler, more intelligent, *and* more powerful? I might even buy OS/2 to use it.

As always, I'm interested in your opinions on this or any other subject. Write to me at *PC World*, 501 Second St., San Francisco, CA 94107; fax 415/442-1891; or MCI Mail Richard Landry/301-3685. ●

POWER TIP NO. 46

A Script Log for Smartcom

To help debug scripts, *Smartcom III* can record everything that occurs while a script is running—including the remote system's responses—and save it in a file. The program labels the file with the script name followed by the extension .log. You can display the file or print it via the program's edit function. To create a script record, press A (Activity Settings) from the main menu, then press M (Modify), and enter a setting. Next, highlight Terminal Emulator Settings and press <Enter>. Select Output to Log File and press L (Log). Press <F8> to save the file. Remember, each time you run the script with this Activity Setting, *Smartcom* replaces the record file.

Toru Tanaka
Los Angeles, California

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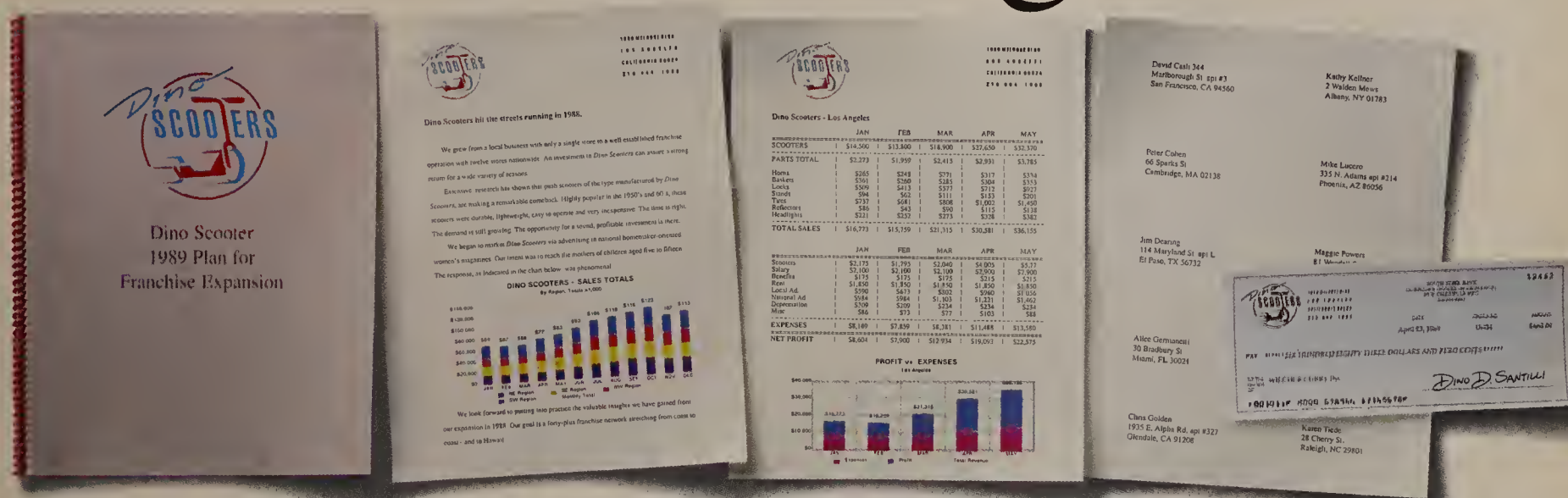

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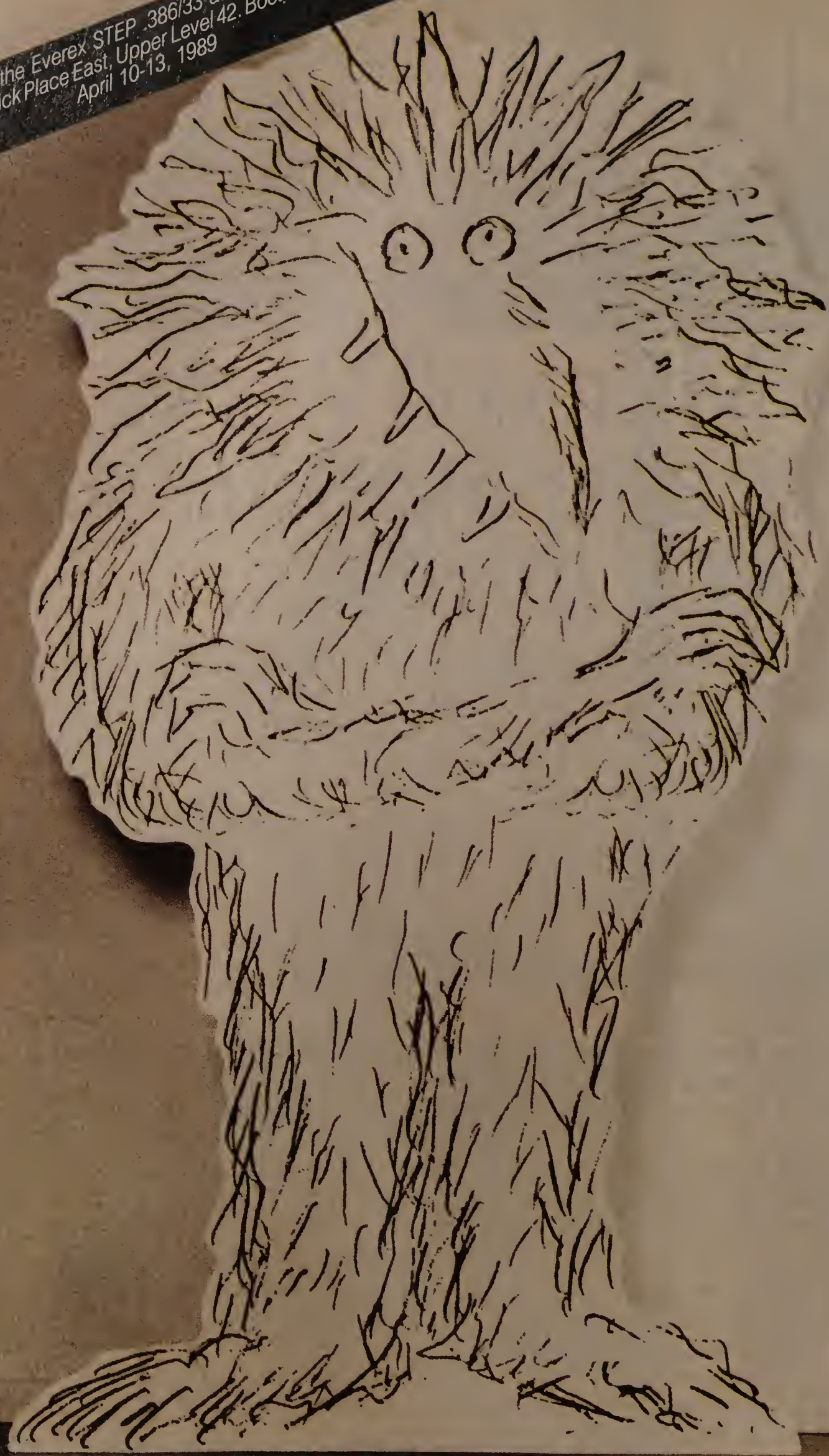

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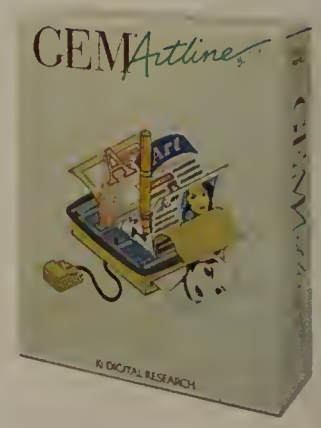

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Circle 266 on reader service card

LETTERS

Reactions and responses from the PC World community

MCA Is the Only Way

I doubt that it was intentional, but it almost looked like a dirty trick to publish Jim Nech's "Which Bus To Take?" [*Another Angle, PCW,* January 1989] only a month after your comprehensive survey of MCA add-in products ["Buyers' Guide: Everything You Need to Upgrade Your PS/2," *PCW,* December 1988]. In the same January issue, *Top of the News* reports IBM's claim of over 600 available MCA boards. It's pretty clear that Mr. Nech's charge that third-party add-in boards for the PS/2 are unavailable is simply untrue. Don't forget that most PS/2s don't require many common boards (video adapters, serial/parallel ports, mouse ports, extended memory) because those features are included on the motherboard.

Mr. Nech's real gripe with IBM? First, the company charges a royalty for the use of technology it owns (those dirty guys!). Second, IBM didn't "cooperate" with its competitors to ensure that only one 32-bit bus was offered to the public. But that's the way markets are supposed to work. While everyone's been cheering the Gang of Nine (Compaq, Tandy, Dell, et al.), no one has complained that they are agreeing not to compete or innovate. Somebody should sue them for restraint of trade.

Peter H. Strong
Los Angeles, California

Jim Nech's perspective doesn't make much sense. While quick to chastise IBM's MCA, he overlooks serious problems with the EISA bus.

EISA *is* another standard. Yes, our old boards will fit, but they won't take advantage of any new features—only EISA boards will. That the EISA bus will accept our old boards is its albatross. If the AT bus's performance is fine with you, relax; like most personal computer users, you need neither EISA nor MCA. But like it or not, high-performance multitasking does call for new bus designs; MCA will certainly outperform any reworked AT bus.

Wade Bjerke
Los Angeles, California

Can't Help But Take It Personally

In the February 1989 *PC World,* the cartoon "Two-Fisted Management" insinuates that Gladys Del Rio's duties as family planner, PTA member, Brownie den mother, and so on represent the very bottom of the career ladder, and that she is a failure. That's news to me!

I hold several of these positions, and I am also a computer assistant at my boys' elementary school. Your cartoon is very offensive.

Rhoda J. Turner
Houston, Texas

PackRat Wronged in Review

I object to some criticisms of *PackRat* in *PC World*'s February 1989 issue [*The Software Shelf*].

The reviewer feels that *PackRat*'s presentation is "cluttered" and could be simplified by combining many of the program's facilities. The various facilities are similar in the ways they let the user enter and search for information, but they certainly are not redundant. Each possesses attributes tailored to a specific type of data. Combining facilities would make it harder for users to remember where information is stored.

The reviewer also misunderstands the purpose and use of *PackRat*'s Index Cards. Cards can be associated with Phone Book entries and disk files, and located by using up to eight keywords and a date. In fact, because of the many ways you can

(continues)

ANTHONY RUSSO

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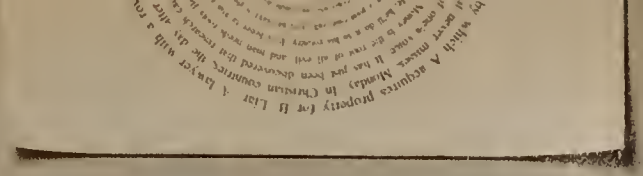

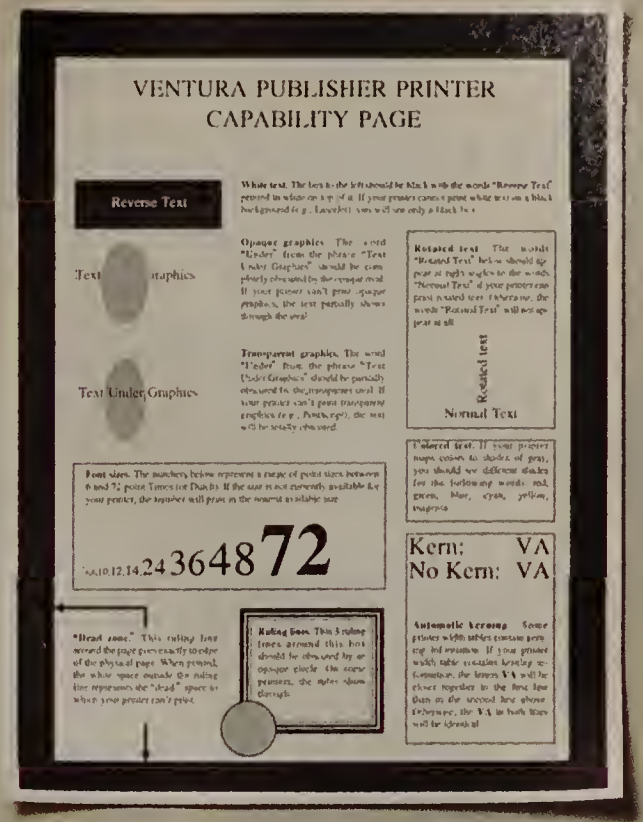

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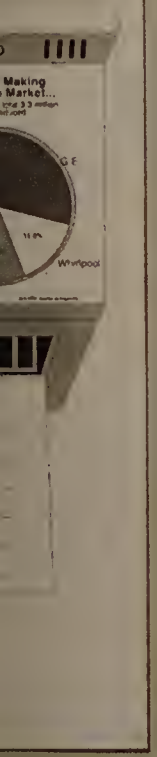

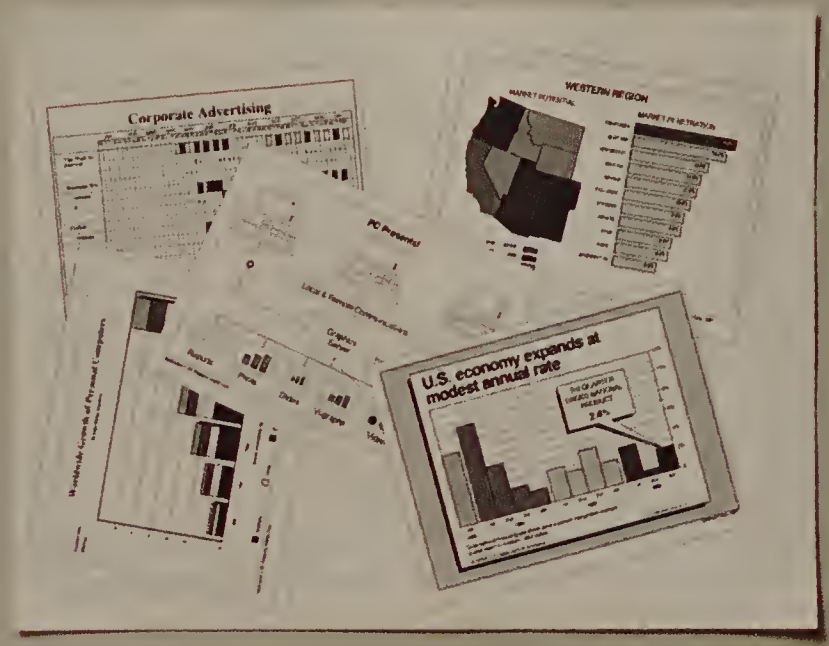

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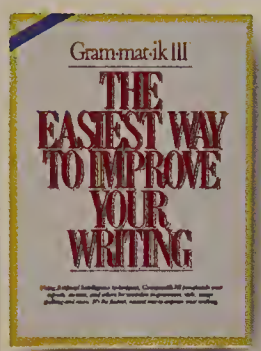

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find information in *PackRat*, we didn't feel that a browse function was necessary, nor have our customers requested such a function.

PackRat 2.0 is now available, and it incorporates more than 20 major improvements *PackRat 1.0* users have suggested. We didn't make a single change in the areas your review criticized.

J. R. Leach
President
Polaris Software
Escondido, California

My criticisms of PackRat *are based on the belief that a personal information manager should simplify the tracking of information. A personal information manager shouldn't call on the user to remember in which of nine facilities a piece of information resides.* PackRat *wisely depends on its search capabilities as the main vehicle for locating stored information. So why all the separate cubbyholes?*
—Patrick Marshall

Word Macro a Dead End for Daisy Wheels

I use many of the macros in George Campbell's "20 Macros for Word" [*PCW*, January 1989]. But one, the <Ctrl>-E envelope template, won't work with daisy wheel printers. Replacing <Esc>PP with <Esc>PPY solves the problem when you are using continuous feed paper. For cut sheet printing (with feed set to Manual in the Print Options menu), the macro command should be <Esc>PPYY.

The first Y prompts daisy wheel users to mount the appropriate print wheel and then press Y to continue. The second Y responds to *Word*'s prompt to insert a new piece of paper (in this case, an envelope) and then press Y. Without these changes, the macro fails to print the address or close the second window.

Bill Holliday
Huntsville, Alabama

Thanks for the correction—we didn't mean to leave daisy wheel users out in the cold. All printer users should heed your tip on using the envelope macro with cut sheets. Either set the paper feed option in the Print Options menu to Continuous, or replace <Esc>PP in the macro with <Esc>PPY. —Ed.

Power Tip Trip-Up

Power Tip No. 28, on page 54 of the January 1989 *PC World*, is inaccurate.

XyWrite does indeed advance automatically to the top of the next blank page when printing a file. Adding FF=1 to the STARTUP.INT file simply tells *XyWrite* to advance the page by sending a formfeed character instead of multiple carriage returns.

Perhaps the tip was intended as a way to eject the last page of document, which some printers don't do automatically. If that is the case with your printer, add EJ=1 to the STARTUP.INT file.

Gail Freeman
Manager, Technical Support
XyQuest
Billerica, Massachusetts

Watts-Amatta U?

"Power Supply Primer" [*Consumer Watch*, *PCW*, January

(continues)

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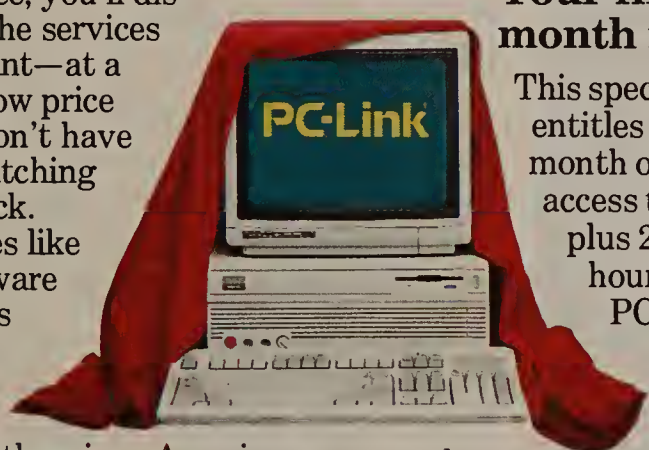

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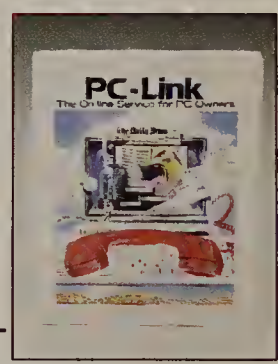

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Circle 225 on reader service card

1989] contains an error. As any first-year physics student can tell you, there is no such thing as 150 watts of voltage. A *watt*, the unit of power, is the product of voltage and current. For example, a unit drawing 15 amperes of current from a 10-volt supply is consuming 150 watts of power.

And just to clarify further: *Overload* protection safeguards the power supply by shutting down when the system demands more power than the power supply can safely provide. *Overvoltage* protection shields the system by shutting down when source voltage exceeds safe levels.

Alan J. Reff
New York, New York

Due to an editing error, we misquoted PC Power and Cooling's Doug Dodson, who certainly knows the difference between power and voltage. —Ed.

Corrections

"Buyers' Guide: Personal Tax Preparation Software" in the February *PC World* contained an error. Contrary to a statement in the article, Softview's *TurboTax* is the only tax preparation program that can print exact replicas of Form 1040 without any special font cartridge. *PC World* regrets the error. The same article incorrectly names MECA's program as *Andrew Tobias' Managing Your Taxes*. The program is now entitled *Andrew Tobias' Tax Cut*.

The network adapters table in "Buyers' Guide: Everything You Need to Upgrade Your PS/2" in December 1988's *PC World* contained several errors. IMC's

(continues)

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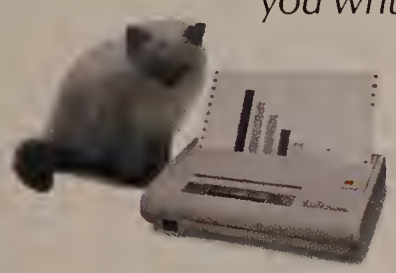

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Circle 76 on reader service card

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- **Standard:** All standard flowcharting shapes included. Custom shapes can be ordered.
- **User friendly:** Don't take our word for it. PC Magazine says "*EASYFLOW lives up to its name. It's hard to imagine any easier and more flexible way to produce basic and even complex flowcharts*". [March 10th 1987 issue, page 278.]
- **Mouse:** Optional but fully supported.
- **It prints:** On most popular matrix printers including IBM, Epson, Toshiba, HP LaserJet, LaserJet-Plus and many others.
- **It plots:** On HP7440, 7475, 7550, 7570, 7585B and compatible plotters.
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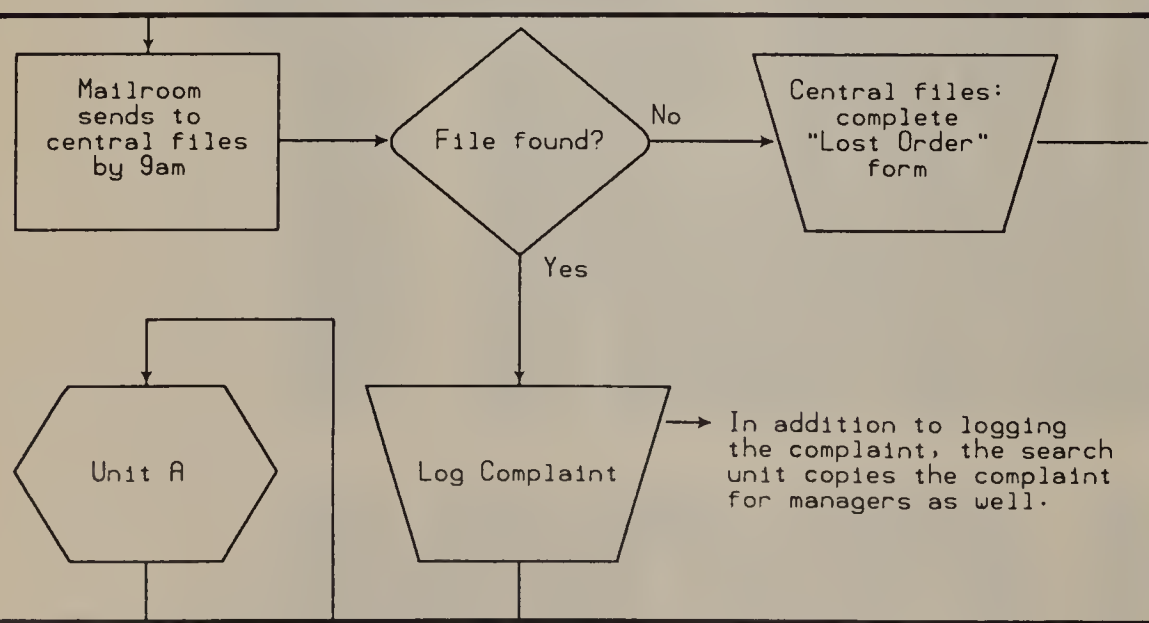

The chart fragment above was produced on an HP LaserJet-Plus and is actual size and unretouched. Publication quality charts like this can be produced using only minutes of preparation time and seconds of print time.

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Information: (613) 544-6035 ext 47
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PCnic II workstation has a list price of $395; the PCnic II file server lists for $425. Both boards support Novell and Ethernet networks.

The correction of the Blackship Trading Company telephone number printed in November 1988's *Letters* was itself incorrect. California callers can reach Blackship at 415/770-9300, cross our hearts and hope to die. *PC World* regrets the errors.

To send correspondence, please see How to Contact PC World, page 4. ●

POWER TIP NO. 47

Dialing on Schedule With ProComm

With *ProComm Plus*'s TEF (timed execution facility) function, you can set the program to start a script file automatically at a particular time. For example, you may prefer to take advantage of lower phone rates at off-peak hours to download E-mail. Press <Alt>-<F5> from the opening menu. At the prompt, type TEF and press <Enter>. Type in the name of the script file and the time you want it to start, press <Enter>, and you're all set.

When you leave for the day, just make sure the PC and the modem are turned on and that the DOS prompt shows on screen.

Phil James
Director of Technical Support
Datastorm Technologies
Columbia, Missouri

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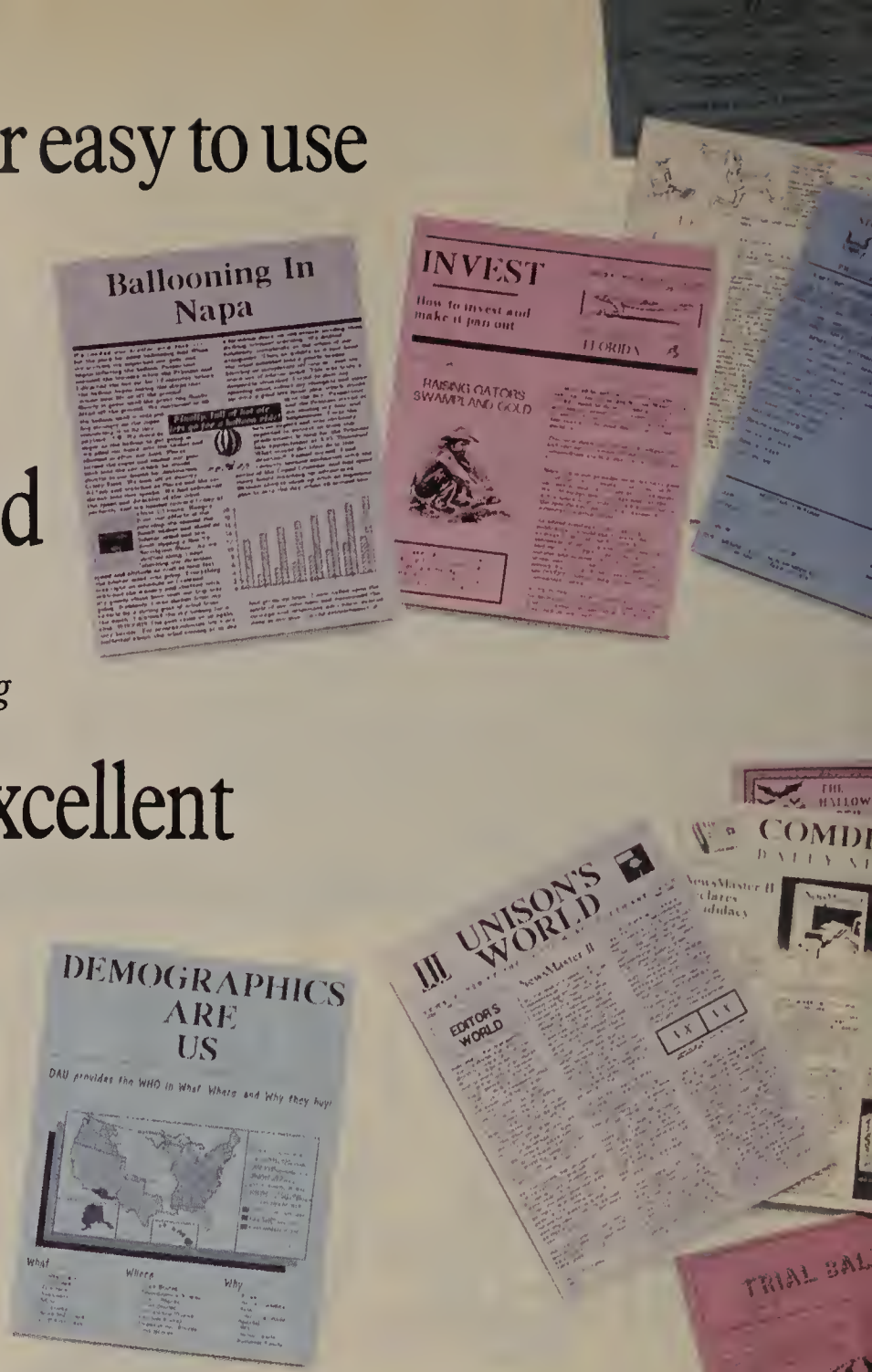

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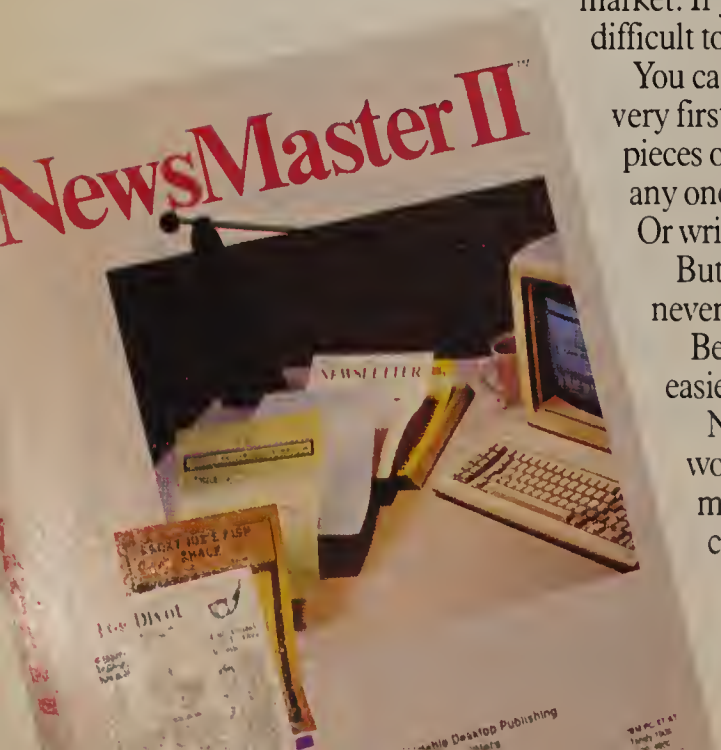

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HARDWARE SPECIFICATIONS: Requires PC/MS-DOS version 2.0 or higher with 384K of usable memory (512K required with DOS 3.3) and a minimum 10 MB hard disk. For use with the IBM® PC, PC XT, PX AT, Personal System/2™ and compatibles. 3 ½" media optionally available. Not copy protected.

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Circle 144 on reader service card

Introducing Close-Up/LAN the remote that lets you control all PCs on your network

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Helping people

You're sitting at your PC on the 3rd floor working on a spreadsheet budget. Suddenly, a message appears on your screen: "Bob requests help". You press a hot key, and like magic you are looking at Bob's screen. Without moving an inch you see that Bob is working on the company database. A dialog window appears and Bob explains his problem. Since your keyboard is active you instantly solve the problem, on Bob's computer.

With another hot key you decide to look in on Sue's computer screen. She's new and you need to keep an eye on her work. You see that she is working on a letter using a word-processor. You monitor her for awhile without interfering with her work. In fact, Sue doesn't even know you're there!

Hot key again and off you go on your rounds of the company. Viewing one screen after another, helping some, watching others. All from the comfort of your chair. Finished, you hot key back to your spreadsheet and carry on with your budget. Amazed, you think that support has never been this easy before.

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As a workgroup problem solving tool, Close-Up/LAN is unsurpassed! Close-Up/LAN lets everyone in your workgroup work as a team. Your associates can chat in a conference, all linked together on screen, no matter how distant the locations. Bring up a spreadsheet, for example, and show your sales projections for all to see. With live keyboards and an instant screen to screen connection, associates can adjust your figures (optionally at your discretion) for what-if scenarios.

On-Network Meetings? Close-Up/LAN lets you conference your people over a single network, over bridged networks, or between networks thousands of miles apart.

Only one program lets you have your meetings on your network, Close-Up/LAN.

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Think of it. You can give everyone on your network the power of all peripherals at a fraction of the cost.

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Close-Up/LAN lets your students watch on their PCs while you solve problems on your PC. Ideal for corporate and university classrooms. You can then reverse the process. Students work at their own pace while you, at the touch of a key, hop from screen to screen, monitoring their work.

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Circle 222 on reader service card

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WILL MOSGROVE

Down for the Count

All's fair in the PC business.

Our friends at Apple may be learning that the hard way.

Many of my columns over the last few years have expressed my great enthusiasm for several new computers and applications that I thought truly propelled the state of the art, making PCs more useful and accessible to more people. As a longtime industry observer, though, I have learned that every advance is only temporary. There are always innovations that render the old standards obsolete no matter how entrenched they seem. In other words, just when you think the personal computing game has stabilized, something manages to upset the applecart.

When Apple first introduced the Macintosh in 1984, for example, the IBM PC dominated personal computing. Personal computers had made major inroads into the business world, PC-clone enterprises were springing up, and it looked as if users had settled on the MS-DOS standard as the only way to compute.

To the consternation of my DOS-based friends, I was enthralled by the Mac from the get-go. It seemed clear that the little Mac's bit-mapped screen and icon-festooned interface were simply better approaches to computing than the PC's command-heavy character mode. If someone was going to compete with the PC standard, this looked like a viable way to do it.

Industry watchers were astonished that Apple had the chutzpah to introduce a computer that required developing a completely different software base. Some thought Steve Jobs and his team had committed corporate suicide —that Apple would quickly fall from glory. And although we tend not to recall this now, Mac sales did get off to a disappointing start. But once Apple beefed up the machine's speed and memory and added a laser printer, exciting applications in desktop publishing and presentation graphics emerged, leading to healthy sales. In addition, Mac enthusiasts enjoyed the advantage of having a standard interface across applications, so they could save time on routine tasks like printing and saving files. Once you knew how to operate one Mac program, you could pretty much pick up others without reading a lot of manuals. In short, innovation propelled the Mac and maintained its momentum for four years.

Largely because of the Mac, many personal computer users acquired an insatiable appetite for graphics-based applications. Software developers found they could innovate in the Mac environment much more easily than in the PC arena. Apple responded to the surge of interest with record growth and high profits, and it became the darling of Wall Street.

Meanwhile, the faster, bigger Macs have become increasingly accepted alongside the PC in corporate America; instead of one standard we now have two. Getting these two previously incompatible machines to talk to each other has become a lucrative new business.

Apple shows great skill in repackaging the Mac in ways that expand its market. The SE and the Mac II are both very successful products. But the company has not shown much imagination when it comes to going further with its platform. Faster chips, more memory, and better packaging are nice, but the creative advantage Apple enjoyed originally is rapidly dwindling.

(continues)

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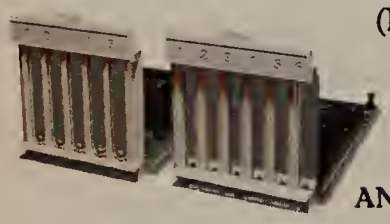

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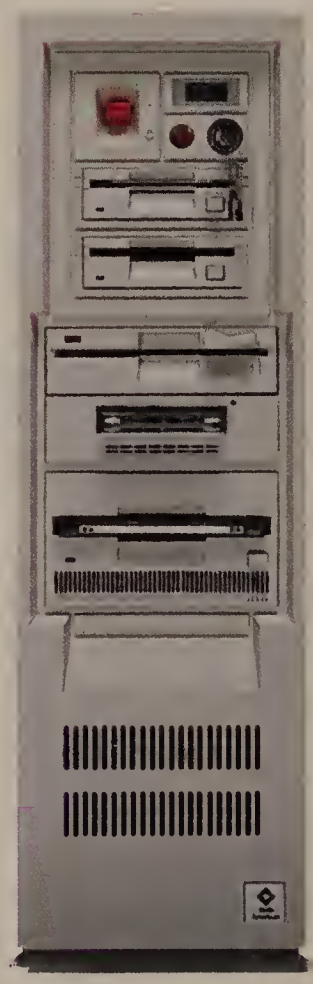

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The truth is that most of the innovation on the Macintosh has come from third-party software developers.

Unlike IBM, which has permitted and even encouraged cloning, Apple has done everything possible to keep its architecture proprietary. This has resulted in high prices and fewer innovations—and that means fewer options for users. Apple has also failed to create a low-cost Macintosh to expand its market share. Today, there are still ten DOS-based machines to every Mac.

Apple CEO John Sculley is very defensive about this fact. When he speaks to groups of computer enthusiasts, he tends to focus on the future of computing rather than on its present, perhaps to obscure the fact that IBM compatibles dominate the business market. Sculley likes to give slick media presentations with nifty ideas about how computing might be done in the future. One such "innovation," Apple's Knowledge Navigator, is mostly a PR gimmick; right now there doesn't seem to be much more to it than the sizzle.

Meanwhile, PC users already have *Windows*, and soon they'll have the Presentation Manager as well as a multitasking operating environment. By the end of this year, all the Mac's innovative advantages will have disappeared. Instead of maintaining its lead, Apple has merely enjoyed a brief, exhilarating rocket ride.

By now we might have expected the Macintosh to sport the kinds of advanced features that Steve Jobs recently introduced as part of his new NeXT computer. Rather than creating sexy slide shows, Apple should have developed its new Mac IIx with read/write optical memory and a custom digital-signal processor chip. In other words, Apple should have been a moving target; instead, it's been a sitting duck.

Once the PC world catches up to the Macintosh, users will find they can choose their hardware from multiple vendors and have bit-mapped, icon-based, mouse-driven computing as well. Many Macintosh users will find themselves buying PCs, just the way PC users switched to the Macintosh.

Mac aficionados have been telling Apple for years now that it should license the Macintosh to other manufacturers. Software developers know this, and they're building new applications to run under the Presentation Manager. And then—maybe—they'll port them to the Mac. They know the PC offers them a much bigger market, and they're excited about that. I have talked to several previously Mac-only developers who tell me they're not only porting their Mac software to the Presentation Manager, they're also targeting new software specifically for this platform.

Apple has had its moment in the sun, but it could soon get cloudy in Cupertino. Meanwhile, I predict that personal computing is about to take another one of those great leaps forward. Let a thousand PCs bloom. ●

This is David Bunnell's last column for PC World.

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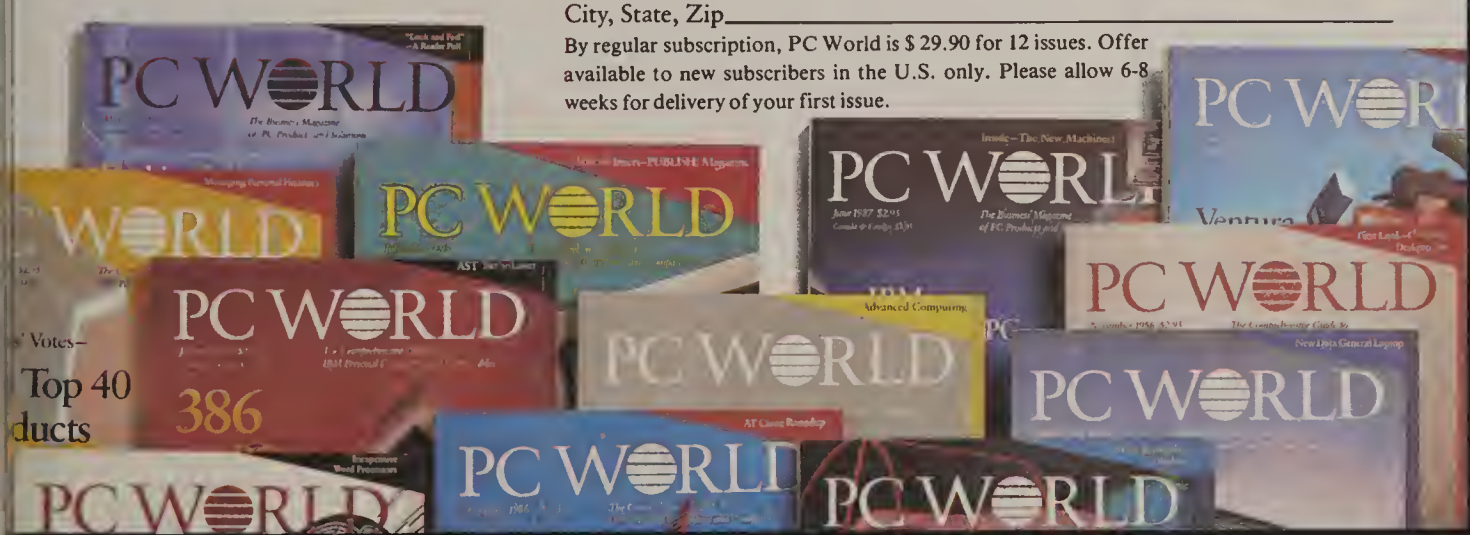

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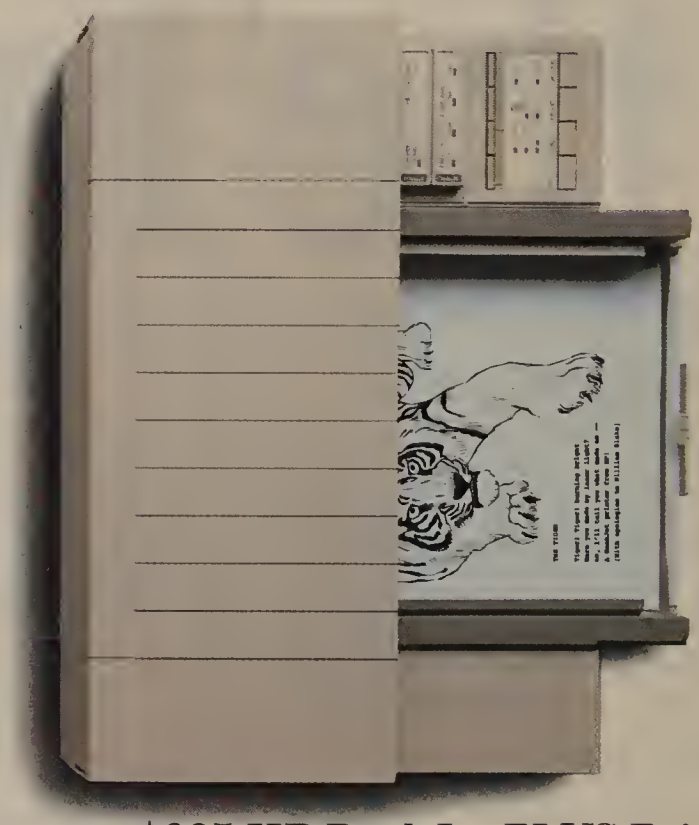

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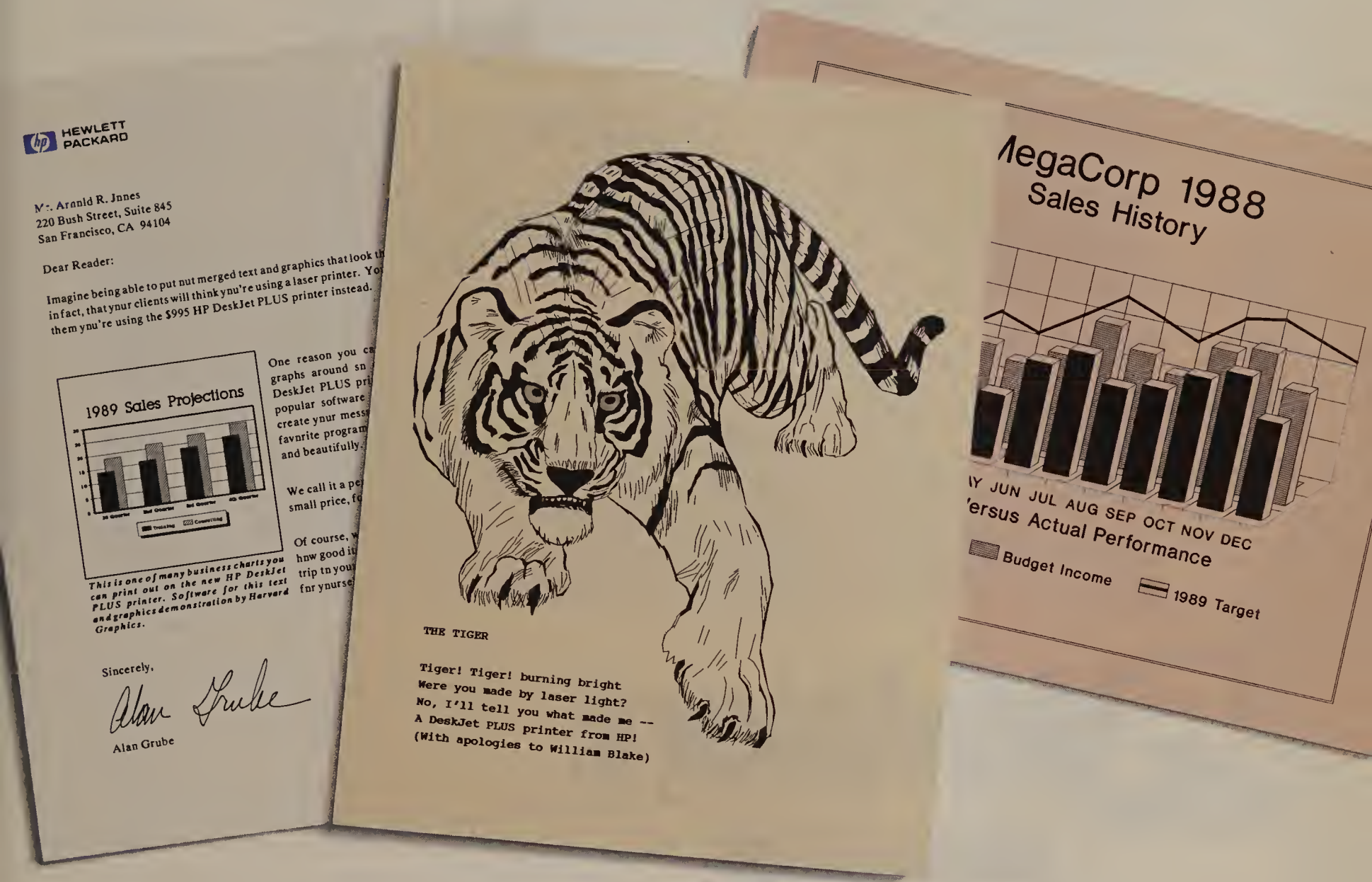
But they keep looking at the evidence.



You won't believe your eyes (or ears), either. The HP DeskJet PLUS printer gives you the same crisp, black lettering. Clean, sharp graphics. And whisper-quiet operation. But it uses advanced inkjet technology to supply these laser-like qualities for the price of a 24-wire printer.

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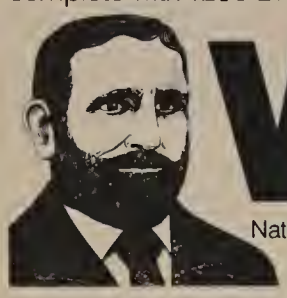

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The heart of any network is its operating system. We look at seven leading server-based network operating systems, focusing on ease of installation, features, and performance. Do DOS-based operating systems have what it takes to keep your network ticking, or will you need an OS/2 transplant?

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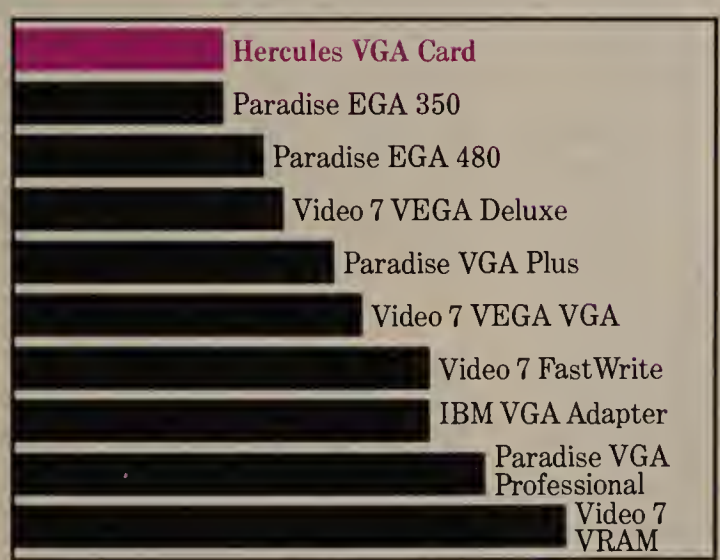

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Stewart Alsop

ROBERT CARDIN

The Rewards of True Religion

There's something to be said for a company that has a vision and sticks to it.

That something is success.

Micrografx is hot. One glance at its visitor sign-in book will tell you: It's chock-full of representatives from venture capital firms, investment banks, Wall Street research departments, major manufacturers, and, of course, Microsoft. Micrografx currently has 140 employees, up from just 30 or so two years ago, and it will likely record revenues of about $20 million this year.

This feverish activity is a very recent development. Two years ago, Micrografx was that "little graphics software company in Dallas run by those two brothers who are the nicest people you would ever want to meet but what a shame it's never going to make the big time." What happened in the interim? Micrografx's religion became mainstream. This change in the company's fortunes really demonstrates the importance of religion in the PC software business.

I'm not talking about real religion here. I'm talking about being in the software business because you have faith in a technical point of view and are willing to sacrifice a lot to prove that you're right.

Plenty of people in the computer business would have you believe that the path to true fulfillment lies in developing a piece of software that can run on any computer in existence with a flick of a switch. That approach is usually referred to as a portability strategy. Portability is a nice dream because it implies that you can run anything you want on any computer without any pain for either the developer or the customer. Unfortunately, it's a dream that will never be a reality.

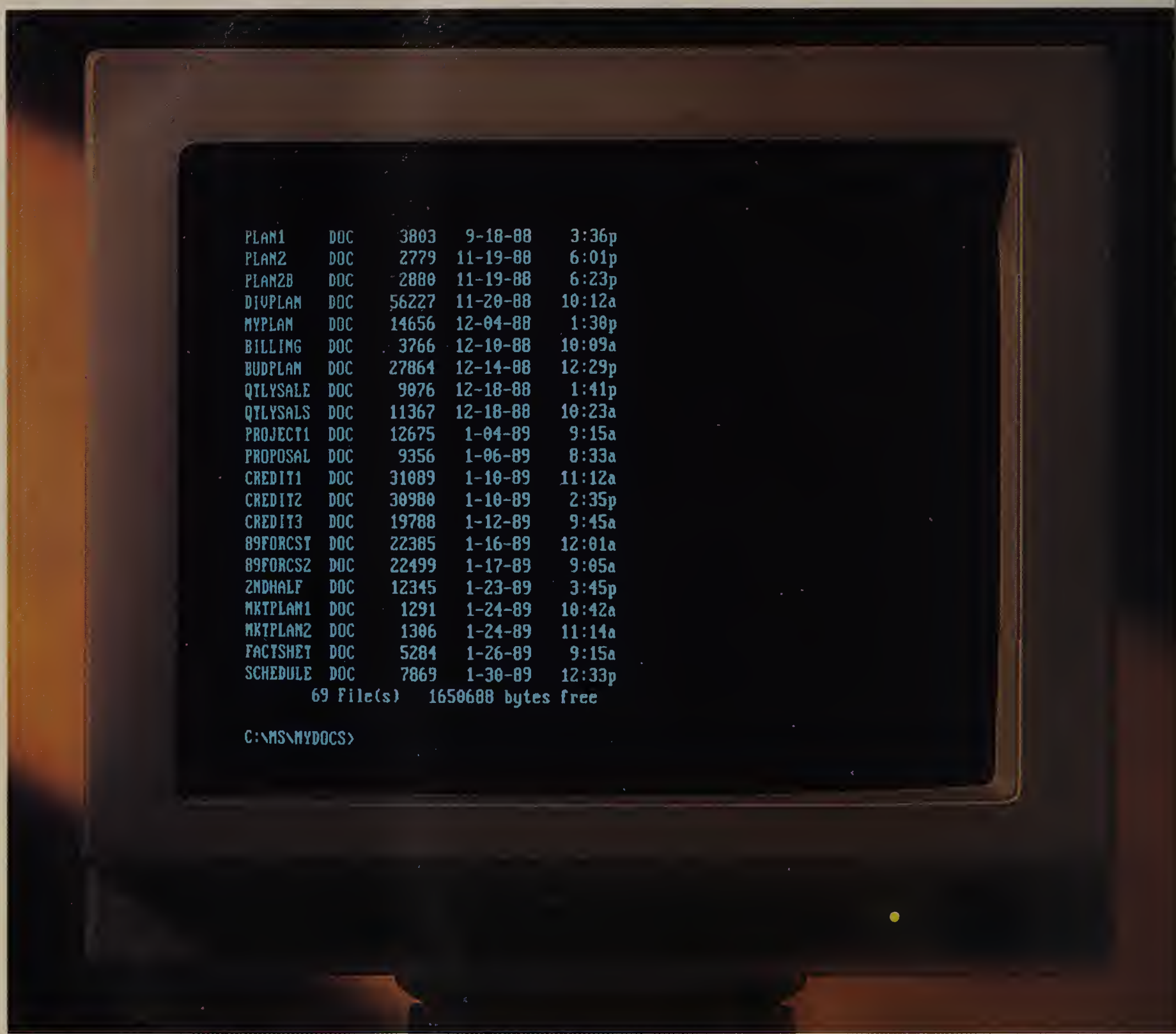
As everybody knows, *Microsoft Windows* has been around for years and has been very slow to attract the kind of application software that would persuade buyers to adopt *Windows* as a standard. Sure, Microsoft has developed a version of its very hot *Excel* spreadsheet for *Windows*, and Aldus has done the same for *PageMaker*. But as any PC user will tell you, those two programs were originally developed for the Macintosh. If you want *Excel* and *PageMaker* badly enough, you're probably better off buying a Macintosh to run them. Indeed, that sentiment summarizes why Microsoft has been having so much trouble getting people to buy into *Windows*.

But a funny thing has happened. That little graphics software company in Dallas run by those two nice brothers (Paul and George Grayson, president and chairman, respectively) has been proclaiming the value of *Windows* for years. It has invested tremendous resources in writing output drivers for *Windows*, in learning the specific programming tricks for the environment, even in learning how to make programs work on both *Windows* and its OS/2 cousin, Presentation Manager.

It has also made *Windows* application software: *Windows Draw*, *Windows Graph*, *Designer*, and *Mirrors*, plus a host of printer and screen drivers. It has run advertisements appealing to PC users who are sick of being told that their machines aren't as good as the Macintosh. Its president has even become chairman of the Windows/Presentation Manager Association for developers and users. In other words, Micrografx has bet the farm on *Windows*.

(continues)

Do they call it a h
it's so hard to find wh



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ard disk because
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they appear in your favorite applications.

Without even having to load the specific applications that created the file.

With Magellan, all you need is a general idea of what you're looking for.

Because unlike other programs, the Magellan Explore function can perform a search on a phrase, a topic, an idea or even an entire file. Not just key words.

Then it lists your "found" files on the left of your screen in order of how relevant the contents are to the search topic.

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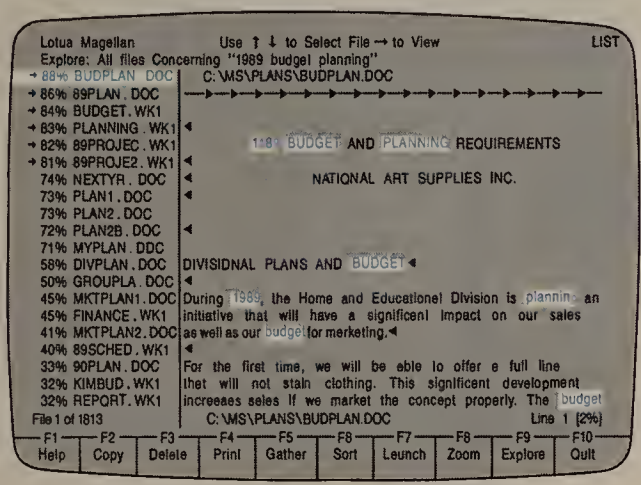

The Magellan Explore and SpeedView functions let you locate everything related to a particular topic and see it as it would appear in its native application.

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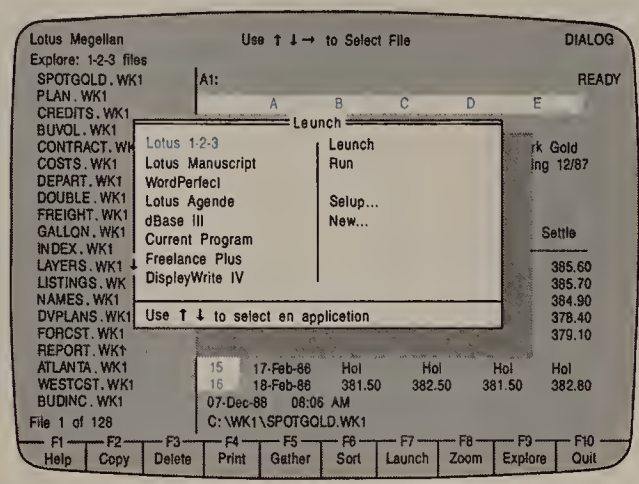

With one keystroke, Magellan loads the selected file and application, in this case 1-2-3, so you're ready to go to work.

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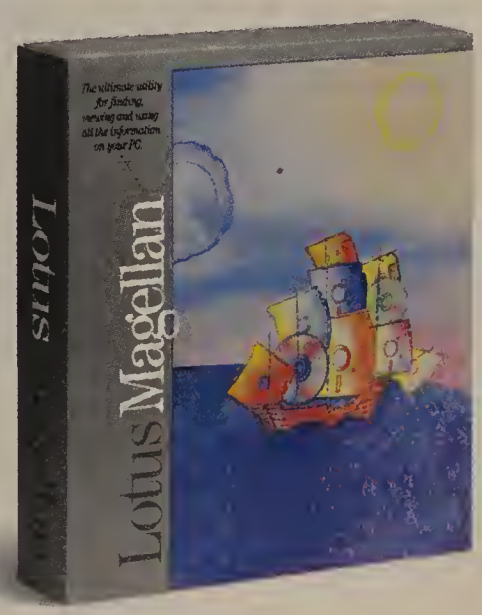

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PC MAGAZINE EDITOR'S CHOICE

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While other companies were futzing around, porting their software from one place to another, Micrografx focused exclusively on developing *Windows* programs. Its *Designer* is now one of the best-selling PC graphics programs around. Recently upgraded and fully competitive with the best the Macintosh has to offer—*Adobe Illustrator* and *Aldus FreeHand*—*Designer* isn't available on the Macintosh.

Micrografx now has a set of its own development tools as well as functional libraries that surpass anything any other company—including those with far greater programming resources—has developed so far. And Micrografx now knows *Windows* as a development environment better than any other company does, possibly even better than Microsoft itself (since Microsoft has, ironically, been very, very slow to put *Windows* software on the market).

Micrografx used to be accused of being pigheaded about *Windows* or stupid for committing so many of its resources to the environment. I wonder how many companies now wish they had gotten the *Windows* religion back in 1986 or 1987, when it wasn't fashionable. And I wonder whether other software developers have learned the real lesson behind software religion. Are they now jumping on the *Windows* bandwagon a little too late? Or are they looking for the next long-term innovation, the one that will pay off in 1992 or 1993 instead of next year? ●

Stewart Alsop is editor and publisher of P.C. Letter *and a contributing editor for* PC World.

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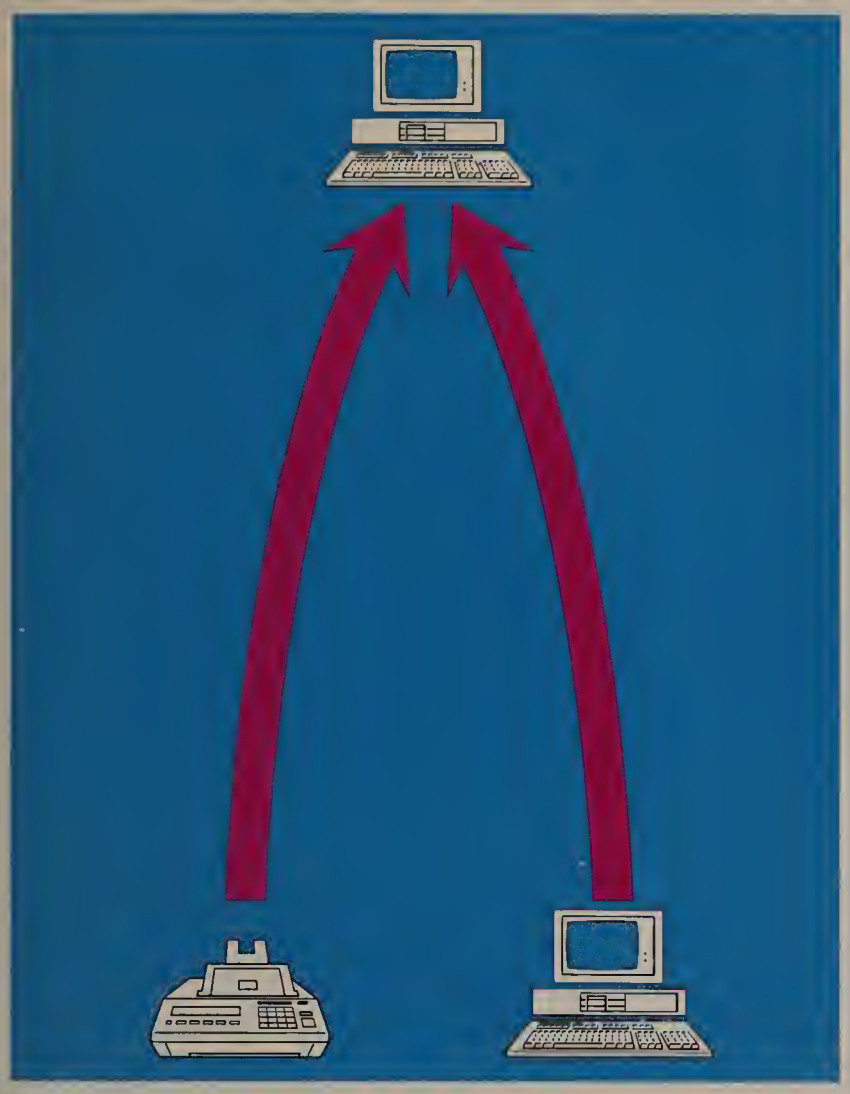

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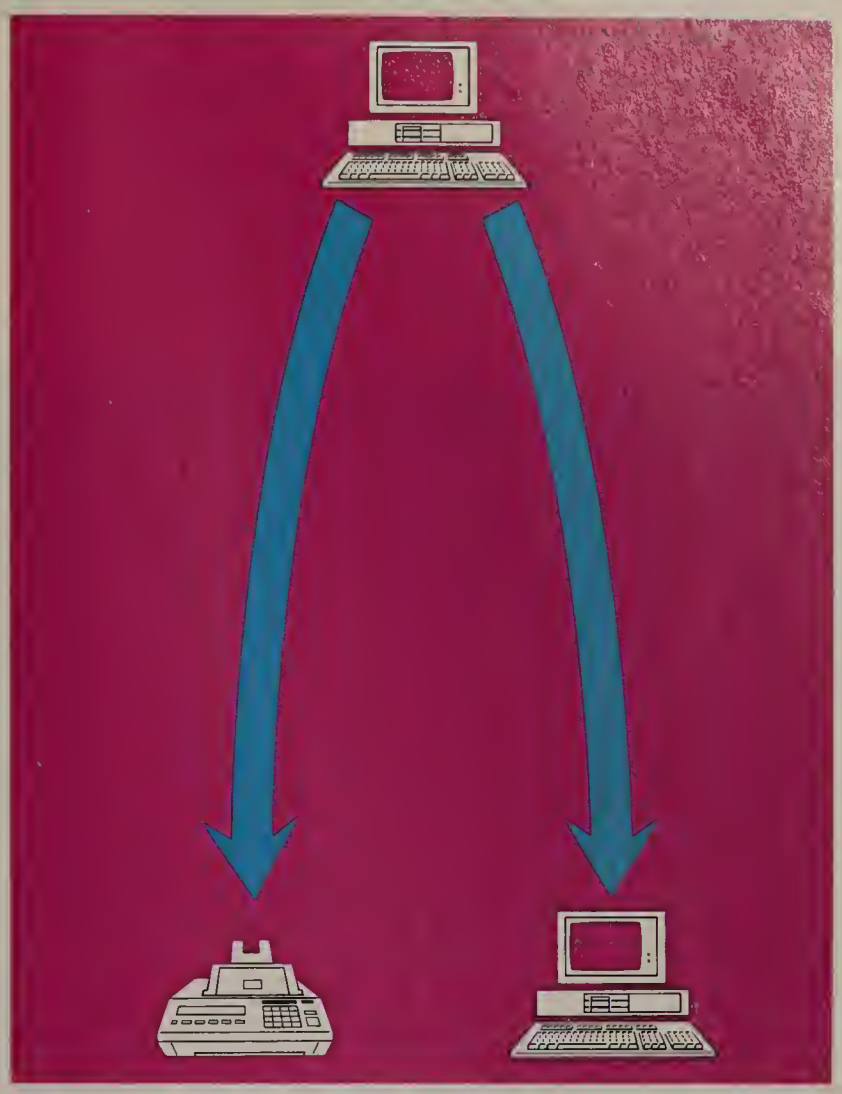

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Acer and Dr. Chu. The hottes

Dr. Stephen Chu, Dallas orthodontist, and his staff use a
Acer computer to predict reconstructive surgery results

reconstructive team in Texas.

A new dimension is being added to reconstructive surgery in Dallas, Texas. Computers.

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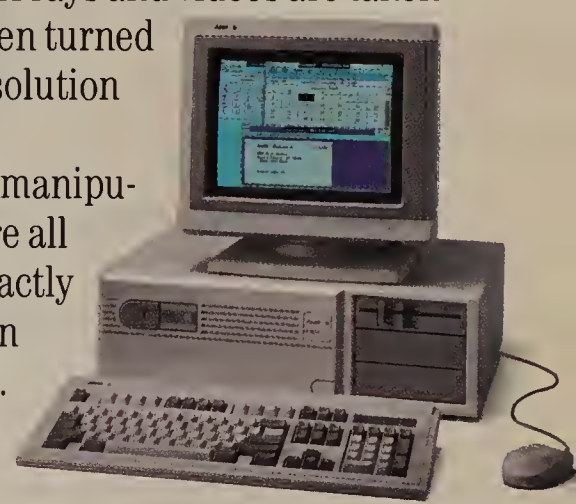

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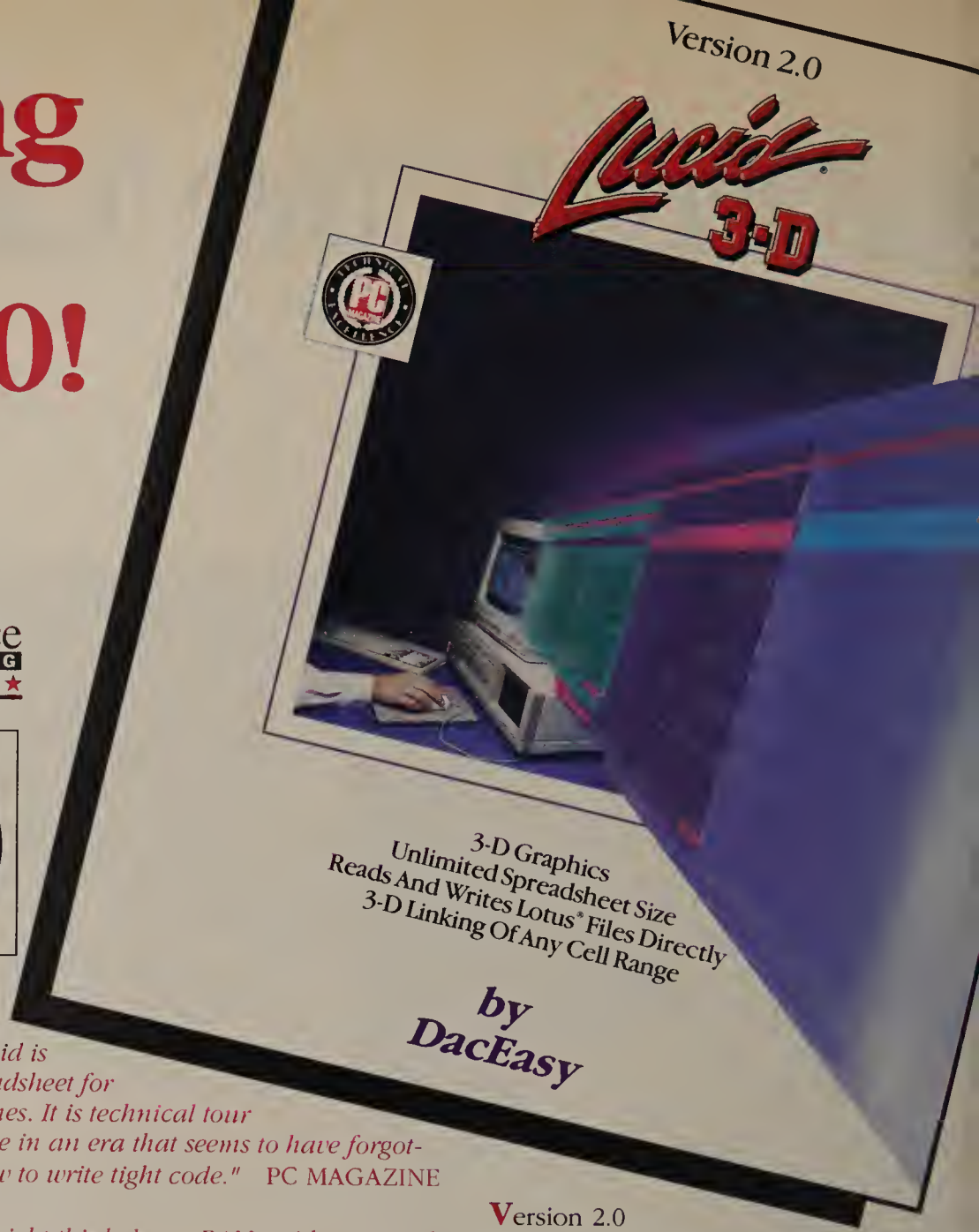


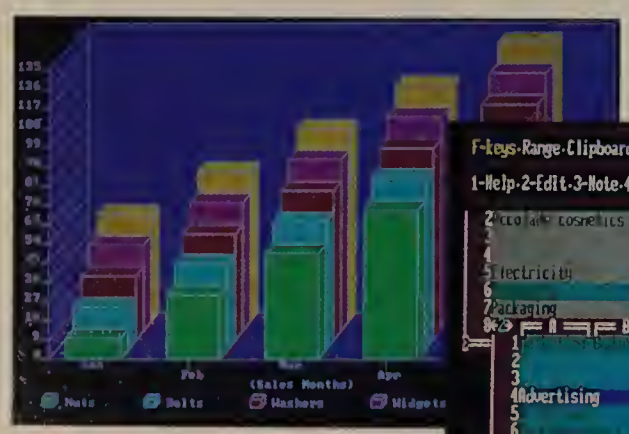
Version 2.0 of Lucid 3-D is more than a bag of new features. It's a masterwork! The original Lucid 3-D captured the industry's attention with its simple to use, yet remarkable three dimensional capabilities. Last year's winner of *PC Magazine's* Award for Technical Excellence, Lucid 3-D is fast, even on a 256K, 8088 computer. Lucid 3-D is the super spreadsheet that doesn't require a super computer!

DacEasy is proud to produce this leading edge product. Its innovative design allows first time users to learn quickly while power users of other spreadsheets move to our advance features effortlessly. The Lucid 1.0 featured pull-down menus, optional instant command keys, multiple windows, a notepad in every cell, optional ram, total mouseability and both a reference and tutorial manual. These features alone make this spreadsheet a must buy at only $99.95. It's no wonder Lucid 3-D was voted Editors' Pick for 1988 by *Home Office Computing*.

"Lucid is a spreadsheet for our times. It is technical tour de force in an era that seems to have forgotten how to write tight code." PC MAGAZINE

"You might think that a RAM resident spreadsheet would necessarily be limited in features. We found that Lucid 3-D is anything but limited in power." INFOWORLD

"Lucid 3-D is a package that could alter the face of future spreadsheets. It offers residence, multiple windows, colour, mouse support and rapid execution." PC USER



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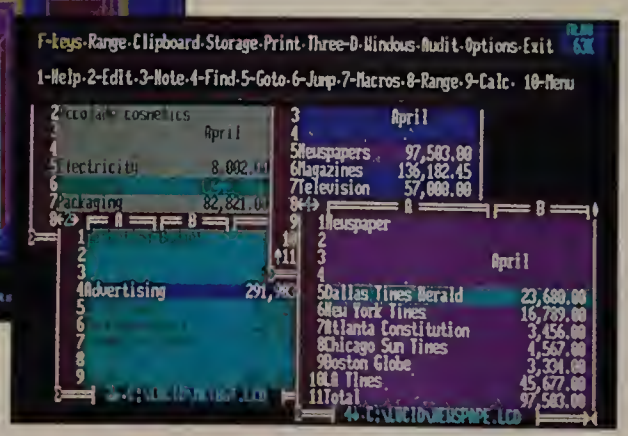

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Media Code #21

Edited by ERIC BENDER

Version for PCs, XTs

Lotus Fills the Gaps in Its Spreadsheet Strategy

Are Two 1-2-3s Better Than One?

Release 3.0 finally demanded a new technique to overcome DOS memory limitations, says Frank Ingari.

RICHARD HOWARD

It all began with Lotus Development's inability to fit *1-2-3* release 3.0 gracefully into 640K of memory. That caused Lotus to miss its 1988 update schedule by a mile, depressed its fourth-quarter earnings by about 60 percent, and subjected the company to more than a year of public criticism.

But that failure to deliver may end up strengthening the high garden wall that Lotus has built around its spreadsheet market.

Lotus overcame the 640K barrier last summer, asserts spreadsheet division general manager Frank Ingari, but realized along the way that *3.0* wouldn't please everyone. Instead of trying, Lotus will follow release 3's mid-year debut with a major tune-up of the four-year-old release 2.01 (see the Lotus preview in this issue).

Release 2.2 will be far less innovative than *3.0*, which ironically may make *2.2* the first choice of the 4.5 million users who have made *1-2-3* the best-selling PC application of all time.

Fashioned by committee using a customer wish list as a blueprint, release 3.0 suffers from the kitchen-sink syndrome that afflicts so many tardy upgrades. The preponderance of ambitious features and Lotus's decision to move from fast assembly language to C (for greater portability) inflated the program's code from 100,000 to 339,000 lines.

Size notwithstanding, early testers found the new revision compelling, insists Ingari, and quickly exploited release 3.0's ability to link up to 256 worksheets for budget consolidation. They also welcomed the ability to pull in *dBASE* or even mainframe files via the Blueprint data access architecture, while the new LEAF programming tools will let them build custom add-ins.

(continues)

System Price/Performance Resumes Classic Curve

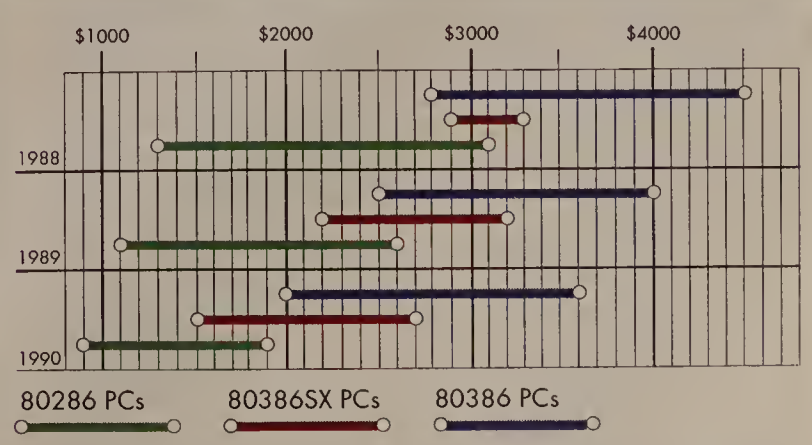
Memory Costs Slowly Declining

Conventional wisdom, which assumes that the PC hardware price/performance ratio improves roughly 15 to 20 percent a year, should reassert itself this year.

Nineteen eighty-eight saw a painful boost in memory prices, and customers often found total system costs dropping only slightly. But now memory prices are slowly subsiding, helping to restore the usual cost trends. "We predict a lot of erosion in system prices in 1989—probably about a 20 percent improvement," comments Dataquest analyst Bill Lempesis.

(continues on page 54)

Slimmed-Down Street Prices



Wohl Associates expects business PCs to continue to show a steady drop in price. Cost estimates are for machines with 40MB drives but without monitor, display adapter, or operating system.

Lotus

(continued)

Lotus expects release 3.0 to redefine the spreadsheet as a front-end analytic/reporting tool for networked data bases. That shift will be reinforced by yet another upcoming *1-2-3* release, the *1-2-3/G* Presentation Manager package.

Release 3.0's functionality comes at a substantial cost. Technically, the program fits into 640K and runs on an XT. But "every new feature we added led users to want more power and memory," explains Ingari. "What we needed was a way to let power users access more memory."

Lotus nixed an expanded-memory approach as too slow. Instead, it turned to DOS extender software, which lets modified DOS applications address up to 16MB of conventional memory. Unfortunately, that approach requires use of the protected mode of an 80286-based machine.

Faced with the prospect of abandoning its sizable base of PC and XT users, Lotus decided to build a second product that falls between *2.01* and *3.0*. Ingari calls the resultant release 2.2 a "fine-tuning and adding of functionality consistent with an 8088." Still written in assembly, the mezzanine program adds only about 30K to the 205K worth of *2.01* code and only a handful of enhancements.

Some of the improvements, such as file linking and cleaner graphics, are less ambitious implementations of *3.0*'s raison d'être. Others, like an undo facility, a macro recorder, minimal recalculation, and additional screen drivers, are built-in versions of utilities that Lotus has shipped separately for months. Release 2.2 doesn't even implement the latest expanded memory spec (another resounding vote of no-confidence for that technique).

But *2.2* does effectively plug up many of the cracks that gave competitors like Microsoft's *Excel* and Borland's *Quattro* entrée into the market. Perhaps *2.2*'s finest feature is its complete compatibility with *2.01* files, macros, and add-ins.

The volume buyers who drive the market hate to upgrade and retrain users, explains Alex Kask, senior manager in charge of Northeastern micro support at Ernst & Whinney in New York. "It really doesn't pay for us to move to a so-called better product." And individual users, who generally employ less than 15 percent of a program's features, aren't crazy about upgrading either, adds Kask. "If it's doing the job, who cares if there's something better?"

User reluctance to abandon a familiar product has proved a formidable obstacle for *Excel*, even though that spreadsheet offers a *Windows* graphical environment, and for *Quattro*, which sells for half *1-2-3*'s price. "Lotus isn't feeling much impact in its core market —the Fortune 500 accounts," observes Jeffrey Tarter, publisher of *Softletter* in Cambridge, Massachusetts. "Those people are absolutely locked in to *1-2-3* because of compatibility issues."

Lotus will counter *Excel*'s outstanding graphics with more fonts and chart choices in release 3.0 and (eventually) with *1-2-3/G*'s full graphical environment. Meanwhile, *2.2* will target the large installed base of 8088/8086 machines and the expanding home office, laptop, and overseas markets. Says Ingari, "We see a heterogeneous marketplace where the coexistence of hardware levels is the rule." —*Mike Hogan*

New IBM Honcho Pushes Next-Generation Platforms

Starting to Bring It All Back Home

"All of a sudden you're starting to see the real value of Micro Channel," asserts James Cannavino.

SUSAN GREENWOOD

Before taking over IBM's Entry Systems Division last December, James Cannavino ran the heart of IBM's business—building the multimillion-dollar 3090 mainframes that live in glass houses. Now he's overseeing a group that churns out some systems with stickers that barely break $1000. How similar are the two jobs?

"They're different and they're the same," says the personable 44-year-old Cannavino. The similarities are most obvious in IBM's plans for its large corporate customers, where PCs are being prepped for a leading role in Systems Application Architecture, IBM's grand unification theory. "Under SAA, Entry Systems is really the linchpin for putting things on the desktop," he explains.

Outside corporate America, IBM's PC customers don't get regular visits from the disciplined

(continues on page 56)

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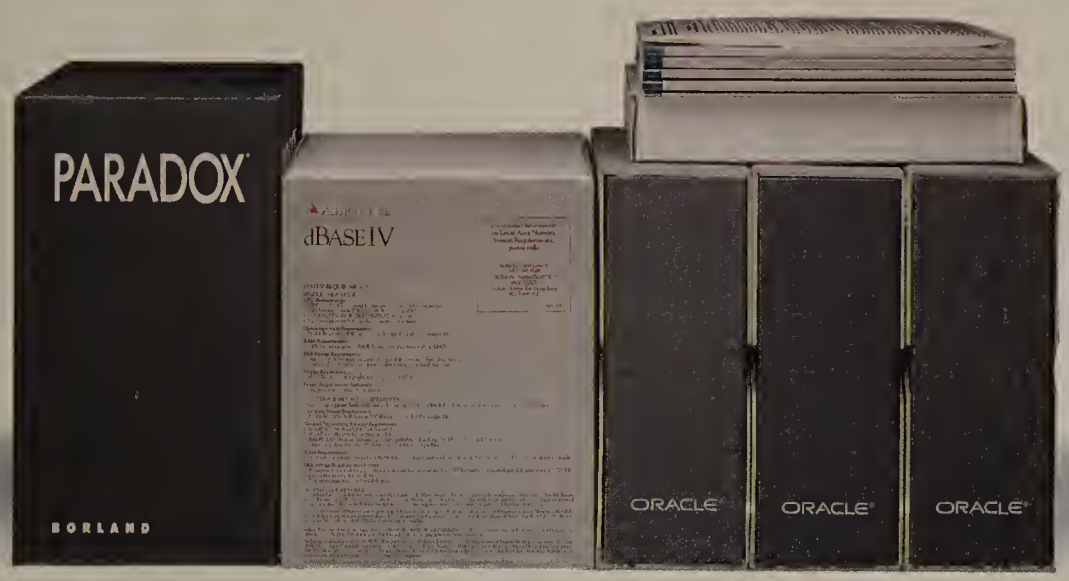

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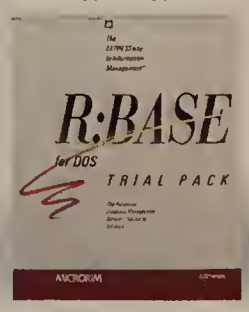

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Curve

(continued from page 51)

Many vendors, particularly low-end contenders, "aren't making a lot of money anymore in 286 machines," remarks Lempesis. "They're trying to get aggressive in 386s."

Current street prices for name-brand 16-MHz 80386 machines with 40MB hard drives vary from $2500 to $4000, says John Murphy, senior analyst at Wohl Associates in Bala Cynwyd, Pennsylvania. "It will be quite a cutthroat game in this segment," predicts Murphy, who expects prices to drop $300 or more.

While the first 80386SX-based machines weren't cheap, "there's heavy-duty pricing competition coming for that class of machine," remarks Bruce Stephen, senior analyst at International Data Corporation in Framingham, Massachusetts. Murphy expects the price range to drop from $2900–$3300 to $2200–$3200 by year end.

Today, 80286-based PCs with a 40MB hard drive and a monitor go for between $1290 and $3000. Murphy forecasts that stickers will drop $400 by 1990; Stephen suggests that prices for high-end models are particularly soft.

Entry-level 8088 systems can be bought for under $1000, Stephen notes. "A year from now, the price could be $650 to $750."

Murphy says that 8088- or 8086-based portables with 20MB hard disks and backlit LCD screens now sell for $1696 to $2240. He expects prices to drop to between $1350 and $2000. Single-floppy versions may soon break the $300 barrier. Laptop 286s currently range from $2370 to $4000, and Murphy predicts they will decline to between $2000 and $3500. But 80386-based laptops remain a specialty segment, and he doesn't expect their costs to drop much.

Last year's memory shocker came as plants changed over from 256K-bit to 1M-bit chips and the United States enforced antidumping restrictions on Japanese manufacturers (a "new hope for the dead" plan for the domestic memory industry).

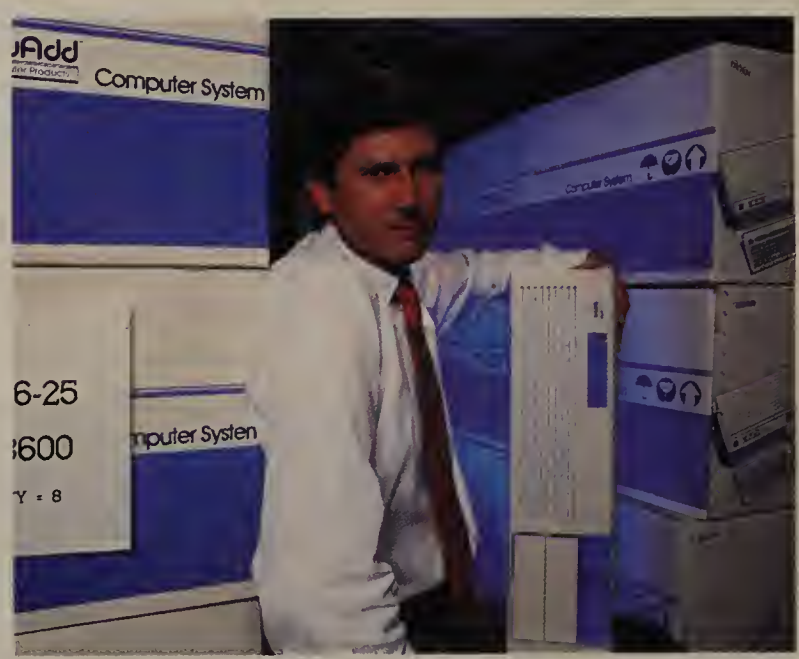
With that turbulence now past, Dataquest sees 1M-bit chips moving back on a classic price curve that will dip from $17.50 in 1989 to $3.89 in 1992. Lower component costs take months to trickle down to dealers. Murphy claims we'll know that the normal course has resumed when standard 386 memory configurations begin to climb.

Naturally, customers should watch more than these global trends. "List price isn't always the best barometer," as Stephen points out. "You're seeing more deals being done." In AT-class machines, for example, IBM is getting much pushier than its nominal pricing would indicate. Buyers also can profit by keeping an eye out for companies clearing out stock before new models appear, or simply caught with too much inventory, as happened to Wyse in a big way early this year.

Customers also benefit from quiet upgrades in what's considered standard equipment—two years ago, an AT didn't include VGA on the motherboard and didn't run at 12 MHz. —*E. B.*

CompuAdd's No-Frills Strategy a Booming Success

Retail Outlets Supplement Mail Order



"We all sell the same commodity," Bill Hayden remarks, so CompuAdd concentrates on low overhead.

From the industrial carpet in the owner's office to the absence of secretaries, memos, staff meetings, and other trappings of corporate life, nothing at CompuAdd Corporation's low-rise headquarters suggests that it has quietly evolved into a large PC reseller. But $241 million worth of PCs, peripherals, software, and accessories flowed through its mail-order and retail channels last year.

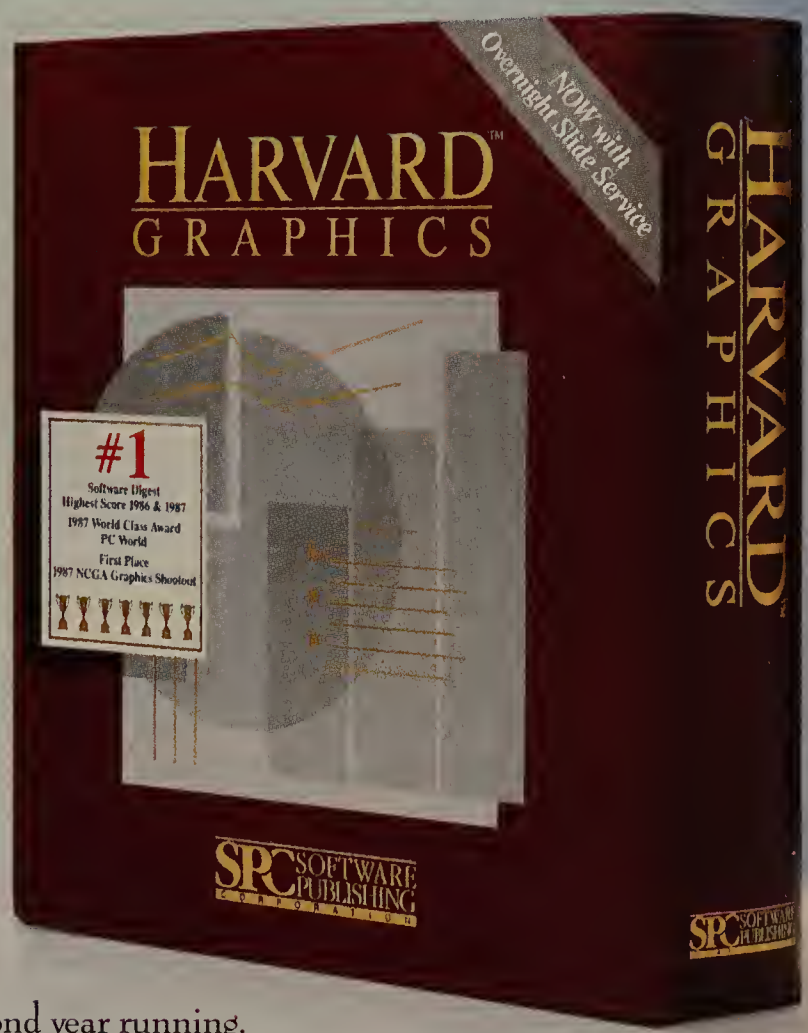
That puts it on a financial par with crosstown rival Dell Computer, which racked up an estimated $250 million in 1988 revenues. But the two companies (both founded in 1983 in Austin, Texas) couldn't have more different operating styles.

Marketers in Dell's glossy headquarters concentrate on pitching high-end systems to high-end customers, and executives bristle if you call Dell a mail-order house.

CompuAdd founder Bill Hayden happily ships bare-bones Taiwan-built XT clones to home users while wooing big companies with CompuAdd-designed 25-MHz 386 systems. He plans to increase his 15-store retail chain to 40 and enter Canada this year. But he's not stepping back from the

(continues)

A Few Words From The World's Most Celebrated Graphics Software.



Thank you. For those of you who haven't heard, Harvard Graphics from Software Publishing has gotten a lot of recognition from the trade press. Why, you may ask? Certainly our crisp, high-speed output helped influence InfoWorld readers to name us Product of the Year. And the easy access to so many chart and graphing options must have helped PC World's audience give us their World Class Award for the second year running.

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Cannavino

(continued from page 52)

legions of Big Blue direct-sales personnel. Instead, they're likely to buy from ComputerLand—or even department stores, where IBM tested successfully last Christmas season.

But over time, corporate and home users will be getting similar equipment. A decade from now, a typical starter system will be far more capable than today's 386-class PCs, Cannavino predicts. And as telephone networks improve data transmission quality, and on-line services broaden their appeal, SAA paraphernalia like OS/2's Presentation Manager will be "a natural not just for business, but for the home user, too," he says.

This year, with the Presentation Manager and other OS/2 keystones in place, IBM is waiting for applications to blossom. The company has acknowledged cost concerns about making the transition, and discreetly launched an OS/2 rebate program early this year. But Cannavino says it would be a mistake to offer a new operating system that didn't stretch the technology. Not only is the memory crisis abating, but IBM is starting to pump out 4M-bit chips, he says. "Those fundamental gates are starting to free up."

IBM's hardware platform, the PS/2's much-debated Micro Channel Architecture, now shows a hand of over 700 cards, including a few intelligent busmaster devices. "All of a sudden you're starting to see the real value of Micro Channel," Cannavino declares.

He dismisses the competing Extended Industry Standard Architecture, saying that rival manufacturers are intent on preserving customer investment in existing AT boards rather than investment in systems. "It's an interesting debate, but they're three years late with that argument." While Cannavino expects other vendors to launch Micro Channel machines, he says IBM won't soften its licensing terms to encourage such entries.

He arrived after a tumultuous year for ESD. The division trimmed thousands from its ranks in Boca Raton, Florida, as it transferred manufacturing to other IBM sites. A flurry of executive departures was capped by division head Bill Lowe, who jumped ship to oversee Xerox's manufacturing and development. And although head-on competition looms for high-end PCs and workstations, IBM headquarters moved ESD's workstation effort into a separate division under Nick Donofrio, formerly ESD's second in command.

A hands-on, technically savvy manager, Cannavino says he finds excitement at the end-user level. "I'm a home user of DOS, OS/2, and UNIX machines; I install and configure them myself." He's also been known to show IBM products to his neighbors and check their reactions—not, he acknowledges, something he could do in his previous position. "It's hard to take home a 3090—that's six tons full of fun."
—*E. B.*

CompuAdd

(continued)

mail order business that provides four-fifths of the company's total sales.

Last year CompuAdd grew even faster than Dell, doubling its revenues and raising its employee count to 560. Hayden predicts that this year the company will take in $480 million. The 41-year-old former Texas Instruments engineer still owns all CompuAdd stock; expansion has been financed through retained earnings.

The rest of the mail-order industry hasn't shared the bonanza, as predatory pricing and mass-market merchandisers keep paring the ranks. "It's getting better," says Carl Albrizzi, president of Scottsdale Systems, a Tempe, Arizona, mail-order house, "but the whole industry's still hurting somewhat."

For big-league mail-order marketers, the required levels of support, warranty, and service keep climbing. One-year warranties, 30-day money-back guarantees, toll-free telephone support, and optional third-party on-site service contracts are becoming the norm.

"We all sell the same commodity," Hayden says, so cost is critical. "The difference between our price point and our competitors' is based on overhead." Additionally, few mail-order firms can match CompuAdd's depth of nine systems. The company sold Epson, Hewlett-Packard, and less prominent PC brands before restricting itself to its own label last fall.

Besides PCs, the catalog is stuffed with printers, modems, drives, boards, software, facsimile machines, and copiers—"anything that's in an office," says Hayden, who expects increasing competition from office suppliers.

Forced into retailing soon after startup by customers who descended on his mail-order shop, he's found that retail outlets—furnished as austerely as his own office—offer higher margins by minimizing advertising costs.

Unlike Dell, which transformed its image into that of a manufacturer who sells direct, "CompuAdd still deals in a commodity mentality," says Bruce Stephen, senior analyst at International Data Corporation in Framingham, Massachusetts. Although CompuAdd shipped 100,000 systems last year, its flood of accessories makes it seem less like a computer maker, he says. But by year-end, Hayden says, CompuAdd will compete with Dell directly for corporate business via outbound telemarketers and top-shelf products.
—*Mark Henricks*

Mike Hogan is PC World's *news editor, and Mark Henricks is a contributing editor in Dallas.* ●

TWO-FISTED MANAGEMENT
TAKE YOUR JOB AND SHOVE IT, YOU AIN'T WORKIN' HERE NO MORE
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MAREK 32
THE DAY EVERYTHING WENT RIGHT FOR ARNOLD HARRIS
EVERYONE WAS AT THE OFFICE AND HARD AT WORK 19 MINUTES BEFORE MR. HARRIS.
!
THE PRESTIGIOUS HENDERSON ACCOUNT CAME THROUGH; WORTH IN THE NEIGHBORHOOD OF 2 MILL' IN ANNUAL BILLINGS.
Come to papa!
ALL SCHEDULED MEETINGS WENT SMOOTHLY WITHOUT INTERRUPTIONS PRODUCING SOLID SOLUTIONS TO A VARIETY OF NAGGING CORPORATE PROBLEMS.
What if we merged?
THE QUARTERLY REPORT WAS RELEASED WITH A SHINING REVIEW OF PROFITS CONTAINED THEREIN.
Hmm, yes, mmm... I'm liking this ... yes...
A.H. INC. 1989
ZEMCO, ONE HELLUVA MAJOR COMPETITOR, WENT CHAPTER ELEVEN.
You don't say!
NOT ONE BUT TWO BOXES OF CHERRY TWIBBLES DROPPED DOWN IN THE VENDING MACHINE!!
Will you look at that!
KLUNK
KLUNK

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VGA mode shown at 320 x 200

C&C
Computers and Communications

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MultiSync 2A. One SuperVGA monitor.

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NEC

Circle 312 on reader service card

1-2-3 Times Two

The heavyweight three-dimensional release 3.0, which demands AT horsepower, will arrive along with a trim release 2.2 for the masses.

Eric Bender

June, the Lotus executives say. June is when the most popular spreadsheet's powerful and power-hungry upgrade will finally slide into shrink-wrap.

1-2-3 release 3.0 delivers three-dimensional worksheets, glossier graphics, bolstered data base facilities, and a host of other enhancements. The latest twist is the use of "DOS extender" technology, which needs at least an AT and probably more than 1MB of memory to thrive.

Soon after it ships, release 3.0 will be joined by release 2.2, which will live comfortably on 8088-based 640K machines. This upgrade promises numerous improvements over *2.01*—including speed. (But yes, Lotus will still sell *2.01*.)

PC World previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.

Power Up

Release 3.0 drags in the heavy artillery for spreadsheet power users—led by clean implementation of three-dimensional worksheets, a boon for easy structuring in general and consolidations in particular. You won't have to learn any new commands beyond <Ctrl>-<Page Up> and <Ctrl>-<Page Down>, which shuttle you between sheets. You can work with up to 256 worksheets at once—from one file or multiple files.

Release 3.0 includes a new .WK3 format but also reads existing *1-2-3* files. Minimal recalculation and background recalculation speed throughput, although it's too early to assess overall performance.

Hitting <F10> lets you see a graph from wherever you are in the program. Charts can now be displayed next to a worksheet or data base, and they'll immediately reflect any changes in the underlying data. The seven basic graph types come in more than 200 permutations, which can be stored in metafile or .PIC format. Control of text and general graph quality is much improved. Moreover, release 3.0 provides PostScript files, print queuing, and named catalogs of print settings.

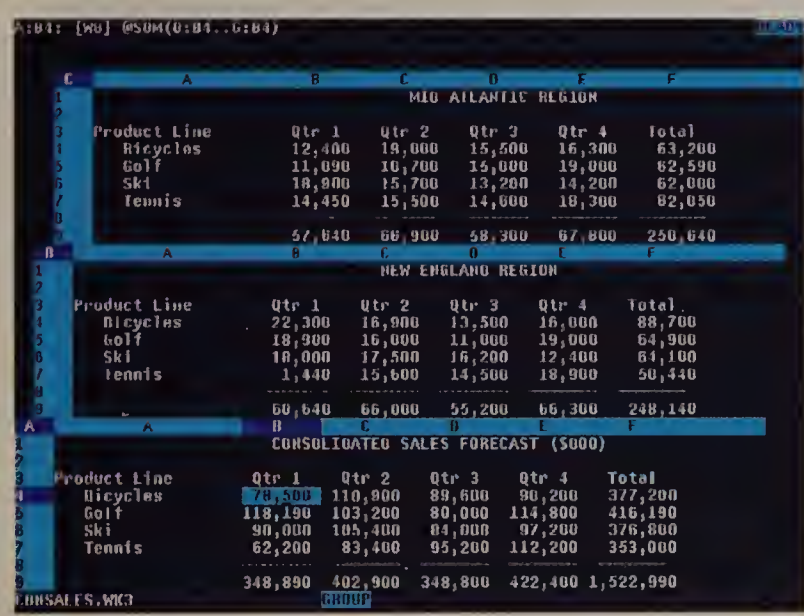
The data base has been strengthened dramatically. Unlike its predecessor, which basically supports one table of up to 256 fields, release 3.0 lets you join multiple tables. You also can do extracts with calculated or aggregate fields and select records in a less cryptic, more query-by-example–like manner. In short, you can tap the combined strengths of spreadsheet and data base tools.

Lotus's emerging Blueprint data architecture lets you work with external data bases, too. You can view lists of field names and characteristics, which help you extract only the data you need rather than requiring you to import entire files. Release 3.0 will ship with a *dBASE* Blueprint driver; Microrim, Oracle, and other data base vendors have pledged support.

The program includes a macro recorder, a clever Undo scheme, and added command keywords. For network use, it bundles in redirectable device support and flexible file-locking schemes. To simplify worksheet auditing, you can attach notes to cells or range names and produce a worksheet schematic with symbols for numbers, labels, and formulas.

Release 3.0 runs in 640K, but not quickly, and three-quarters of Lotus customers buy ATs or better. So Lotus has turned to DOS extender technology, which gives a single, slightly modified DOS application access to

Release 2.2 brings file linking, an undo function, and many other undramatic but welcome enhancements.



Release 3.0's three-dimensional architecture aids worksheet structuring, but 1-2-3 remains easy to navigate.

up to 16MB of memory via the 80286's protected mode. DOS, the DOS extender module, memory-resident packages, and network software can all fit into the first 640K, while release 3.0 automatically exploits available extended memory.

The release 3.0 package includes both DOS and OS/2 versions, with essentially identical functionality and documentation.

The 2.2 Engine

Release 2.2 is the fastest *1-2-3*, Lotus says. While the program incorporates some release 3.0 features, like minimal recalc and a macro recorder, it omits those that demand lots of memory or are prone to incompatibility. It takes about 235K of memory (about 30K more than *2.01*) but retains *2.01*'s file formats and memory management scheme.

For users who don't need release 3.0's power tools, lack the requisite computing horsepower, or need an application engine, *2.2* aims to be a minimum-pain upgrade. It's also a strong endorsement for add-ins—the add-in manager is a top-level menu choice, and add-ins can load automatically.

You don't get 3-D worksheets, but you can quickly build file links and examine a table of linked files. A *Symphony*-like macro library manager lets you run macros stored outside the worksheet. New keywords let you run macros that exit *1-2-3*, run a batch file, and return to the program, among other options. You can also give macros names of up to 15 characters and exploit a much improved macro debugger.

You can't display both data and charts simultaneously, but release 2.2 offers better ways to dress up charts and removes such warts as overlapping legends. Additionally, setting sheets for graphing and printing speed your work.

The data base is unchanged, and *2.2* embodies neither release 3.0's auditing capabilities nor the glossier reporting offered by Funk Software's *Allways* add-in. However, it does feature boosted network support, a back-one-step undo, and search and replace. And it warns you if you try to quit without saving changes. All in all, some *2.01* users will have a tricky choice to make. ●

Eric Bender is PC World*'s East Coast editor.*

SNAPSHOT

1-2-3 3.0, 2.2

Lotus has finally revitalized its spreadsheet with the ambitious, power-hungry release 3.0 and the snappy release 2.2.

KEY FEATURES

- **Release 3.0: 3-D worksheets, access to 16MB of memory through DOS extender technology, improved graphics, some relational data base management features**
- **Release 2.2: increased speed, file linking, improved add-in support, cleaner graphics output, undo capability, minimal recalc, learn mode**

AVAILABILITY

Release 3.0 is expected in June, release 2.2 in the third quarter.

PRICING

Either version $495; upgrade from any earlier release to either version $150 (expected); free upgrade for those who purchased *2.01* after September 1988

Lotus Development
55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500

Reader service no. 710

Alpha Four Normalizes Relations

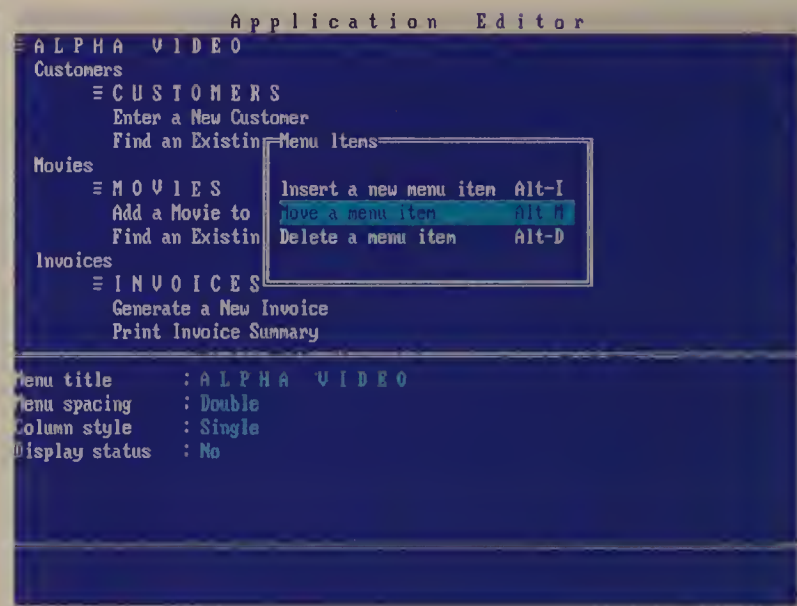
Adding relational capabilities, Alpha Four lets nonprogrammers generate custom applications entirely through menus.

William Rodarmor

While *dBASE IV* steams toward programmer's paradise, Alpha Software's new data base manager is firmly anchored within hailing range of novices. In fact, *Alpha Four* may be the first fully relational data base that lets nonprogrammers generate fully customized applications without writing a single line of code.

Like its *Alpha/three* predecessor, *Alpha Four* reads and writes *dBASE* files directly, generates reports far more easily than *dBASE*, and handles complex data base chores behind a deceptively simple menu interface. But where the earlier program was a flat-file manager, *Alpha Four* lets users access information from multiple data bases simultaneously. Depending on the task, the company says, *Alpha Four* can finish a job in 20 percent of the time it takes *Alpha/three*.

Alpha Four can swallow up to 2 billion records per data base—up from *Alpha/three*'s 65,536—and allows 128 fields per record and 256 characters per field. You can define an unlimited number of lookup data bases for each data base, and lookup tables have grown from 128 rows to 255. Yet Alpha Software hasn't lost sight of its less experienced users: The program comes with extensive online help and a first-rate tutorial, and it even explains syntax errors in formulas and suggests possible corrections.



Thanks to Alpha Four's ingenious use of menus, even novices can generate relational applications that reflect their specific data base needs.

From the Many, One

Entering the relational world of *dBASE*, *Paradox*, *R:base*, and *DataEase*, *Alpha Four* has joined some pretty fast company, yet Alpha has managed to keep things simple. Users can link up to ten data bases in a "set" (which corresponds

to a Structured Query Language "view"), then access data from all of the data bases in the set. For example, it's easy to create a report that combines information from customer, invoice, and inventory data bases.

Creating and editing links between data bases is completely visual: With a few keystrokes, you draw and manipulate a tree-like set diagram on the screen. Unlike the query-by-example approach taken by *Paradox*, *Alpha Four* displays the hierarchy of the set as you create it.

Alpha Four's big plus is its ability to generate custom applications precisely tailored to specific data management jobs. By rewriting *Alpha Four*'s default menu terminology, you could design a complete accounts receivable tracking system so seamless that users would never realize they were running *Alpha Four*. And you can rearrange custom menus at any time without affecting the data.

Building a custom application in *Alpha Four* is much like creating an outline in a word processor. Working via the program's unique Application Editor, you specify user menu choices and tie each menu to either a submenu or a macro (which can be created by a keystroke recorder). A Simulation mode lets you test the new menu system and display the macros that would run at various points. Want to make parts of an application tamperproof? *Alpha Four* lets you protect certain menu options with passwords. To help rookie users, you can write help messages that appear automatically with given menu choices.

Enter (Data) Laughing

Data entry in *Alpha Four* will feel familiar to *Alpha/three* veterans, but new field rules make it far more sophisticated. You can instruct *Alpha Four* to automatically increment a value in a field each time a record is added or updated, which is handy for invoice numbers. You can also define validation criteria, or instruct *Alpha Four* to skip a field during data entry, depending on what was entered previously. (For example, if under 'marital status' the user enters 'single', you can instruct the program to skip the next field, 'spouse's name'.)

Lookups are no longer limited by memory, and you can do indexed searches on the lookup data base. To make data entry faster and more accurate, *Alpha Four* can open multicolumn lookup tables on screen in sizable windows anywhere you want.

Alpha/three doesn't let you change records in Browse mode. With *Alpha Four* you can change and enter records, create multifile browse tables using fields from any data base in a set, and create and store up to 26 browse table layouts per data base.

Finally, screen formatting is both powerful and flexible. Use word wrap in windows and inject color to highlight data you don't want a user to overlook. For example, you can specify that an on-screen sales total blink red if the amount is greater than a specified figure.

Well-Polished Reports

Alpha paid a lot of attention to the report writer, and it shows. You can now define 128 calculated fields per report, up from 20, and nine levels of grouping, up from three. You can create multifile reports using fields from any data base in a set, and include summary values in the formulas for calculated fields. Thanks to what Alpha calls "multi-pass" reports, you can now specify that summary values be calculated before a report section is printed. In the simplest case, this lets you insert a line like 'page 1 of 7' into the report.

Neatness counts, Alpha believes. You can define reports with nonstandard page lengths, specify if and how records should break between pages, and prevent group headers from printing at the bottom of a page.

All this power comes at a price. While *Alpha/three* was priced at $395 and needed 320K of RAM, *Alpha Four* costs $549 and requires 512K. But price, like form, follows function. *Alpha/three* allows relative novices to juggle data without running screaming to a consultant. With *Alpha Four* they can graduate to a full-fledged relational data base and painlessly create custom applications. ●

William Rodarmor is an assistant editor for PC World.

SNAPSHOT

Alpha Four

A powerful relational data base manager, *Alpha Four* offers menu-driven application generation for novices and experts alike, along with easy data entry and flexible reporting.

KEY FEATURES

- **Fully relational**
- **Menu-based application generation**
- **Powerful field rules**
- **Reads and writes *dBASE* files**
- **"Multi-pass" reports**

AVAILABILITY

Immediate

PRICING

$549, upgrade $125 (intraductory)

Alpha Software
One North Ave.
Burlington, MA 01803
617/229-2924

Reader service no. 711

The ProSpeed™ 386 desktop.

To understand its massive power,

In the past, people who were serious about their computers have had a serious dilemma.

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But never could they find a computer flexible enough to give them both.

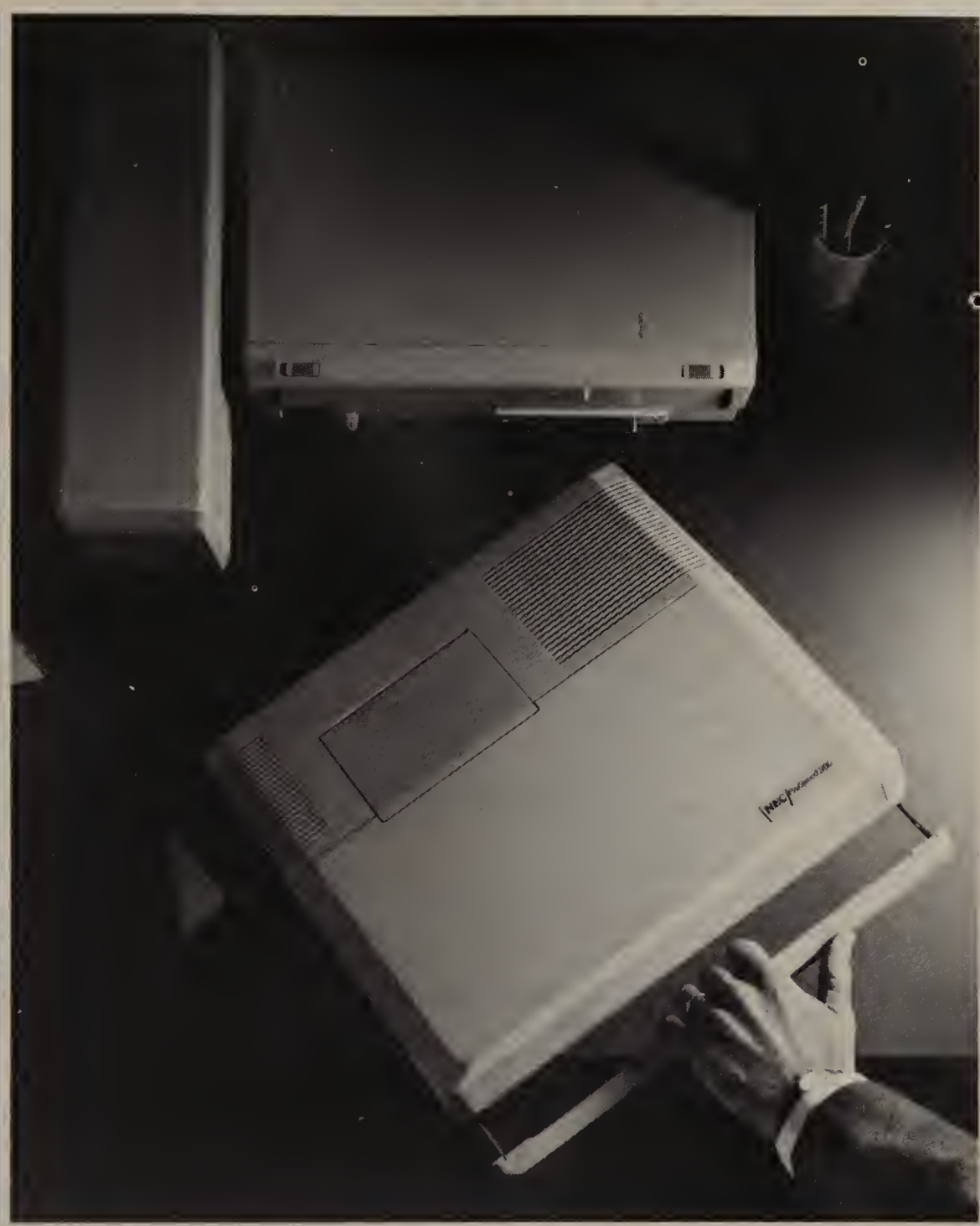
Until now. With the ProSpeed 386 from NEC.

As you'd expect from a powerful 386 desktop, it runs at a swift 16MHz, has a full seven expansion slots and up to four drives. So it can handle anything you throw its way.

And when you want to take it on the road, it's still a high-powered computer. The laptop unit is not only available in both 40 and 100 MB hard disks, it's also battery operated and has up to 10 MB's of memory. There's even a paperwhite monograph screen with EGA

C&C Computers and Communications

you have to take it apart.



resolution that provides the readability and graphics capabilities of a full-sized CRT.

All this and total connectivity capability, too. When you want to turn it back into a desktop, you merely slide the computer into a unique docking station that never leaves your desk. It contains two standard drive bays as well as the capacity for four full-sized cards. So in a matter of seconds, you're fully integrated back into your office.

No manual reconfiguring. No phone lines to connect. No cable hook ups.

The price isn't a hassle either. So if you'd like us to continue taking the ProSpeed 386 apart, call NEC Home Electronics (USA) Inc. at 1-800-FONE-NEC. Or, if you'd like to dissect it yourself, call for product literature at 1-800-826-2255.

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Circle 171 on reader service card

PRODUCT OUTLOOK

INSIDE PRODUCT OUTLOOK

67 **Toshiba T1600, T5200**
The 12-MHz T1600 is the powerhouse of Toshiba's battery-toting portables. The AC-powered T5200 serves as a traveling desktop, rolling at 20 MHz with a CAD/CAM-quality display.

67 **Cypress/2**
One of the few busmasters on the market, the Cypress/2 card smooths the way for PS/2 nets.

68 **AST Premium 386/25, Premium/386/C, Workstation/386SX**
AST's new line features 386 technology tricked out with memory caching. The Premium 386/25 plays the starring role, with speed and power that suit it for file server or demanding CAD/CAM applications.

70 **ViewLink**
Navigate the maze of your hard disk guided by a data/program linker.

70 **GammaFax Communications Professional**
For offices with lots of fax traffic, this fax modem can disperse faxes to a network and transmit them to remote machines at two pages per minute.

72 **Toshiba ExpressWriter301, ExpressWriter311**
Now you can have letter quality printing on the road. The briefcase-size 301 carries a battery, while the 311 has slicker paper handling.

74 **Paradise VGA Plus 16**
Jack up VGA resolution to 800 by 600 while maintaining a palette of 16 colors with this plug-in card.

74 **Megamate**
A petite 3½-inch drive that perches atop your PC for alternative formatting.

76 **R:macros**
Sixty macros, utilities, and templates speed *R:base* tasks and application development.

76 **Fast**
A caching utility that makes input and output of disk-intensive applications up to 60 times faster.

76 **dBOOST**
Some *dBASE* functions execute faster with this memory-resident utility.

UPDATE

78 **TurboTax Personal 1040**
Stay on top of the latest IRS wrinkles with a program that ripples data to all necessary forms.

78 **Data Junction 3.0**
Translate files between incompatible formats, including spreadsheet to data base.

80 **1dir Plus 3.02, Muscle 3.02**
The *1dir* DOS shell eases the process of copying between subdirectories, while *Muscle* beefs up its programming functions.

80 **Twist & Shout 1.09**
Sideways printing, banner creation, and print spooling come to *Symphony*, *Framework*, and *VP-Planner Plus*.

T1600, T5200

New Processors Pump Up Traveling Toshibas

Toshiba has pumped up its line of portables with a pair of machines that add new levels of price/performance. The T1600 weighs in at a mere 11.6 pounds, but it's the new Schwarzenegger of Toshiba's battery-powered lineup. The 20-MHz T5200 brings desktop-style power-boosting techniques to portable computing for those who don't mind camping near an AC outlet. The T1600's sinewy 12-MHz 80C286 easily outmuscles the 10-MHz 80C86 chip in the $2099 T1200—former speed-title holder among Toshiba's battery-powered laptops, a line now stretching from the $1249 8088-based T1000 to the $4999 T1600.

Besides speed, the T1600 offers a 1.44MB floppy rather than the T1200's 720K version, and the new model's 20MB hard drive has an average access time of 27ms, compared with the T1200's 68ms. You can see a difference, too. The T1600 gives you a detachable backlit supertwist EGA screen with 640 by 400 resolution and 16 gray scales, versus CGA on the T1200. Its resolution has been boosted to 640 by 400 by duplicating every seventh scan line. In addition, the T1600 has a pair of serial ports to the T1200's one.

The T1600 comes with 1MB of memory, expandable to 5MB via 2MB modules. And Toshiba wrapped up a loose end by providing a socket for a 10-MHz 80C287 math coprocessor. You won't pick up any extra pounds carrying around the DOS and user manuals—hypertext on-line help comes standard.

If your work doesn't extend beyond the reach of alternating current, or if your data base and financial-modeling jobs need 20-MHz power, the AC-powered Toshiba T5200 is a better choice. Unlike Toshiba's other portables, the 18.7-pound T5200 has an 80386 CPU and a 20-MHz 80387 math coprocessor option and uses disk caching. The basic configuration includes an 82385 cache controller with 32K of 35ns static-caching memory.

The 5200's VGA gas plasma display offers 16 gray scales and 640 by 480 resolution. The machine also provides desktop-style expandability with a full-length 8/16-bit expansion slot and a half-length 8-bit slot. (One step down in Toshiba's line, the T5100 has only a proprietary slot for a modem, a networking card, or a connection to an external expansion chassis.)

The $9499 T5200 has a 1.44MB 3½-inch drive and a 29ms 40MB hard disk. A 25ms 100MB drive bumps the sticker up to $10,999. The standard 2MB of memory can be increased to 8MB with $1299 2MB modules. Toshiba America Inc., 9740 Irvine Blvd., Irvine, CA 92718; 714/583-3000.
—Mark Henricks

Reader service no. 730

Equipped with a 12-MHz 80C286, the T1600 becomes Toshiba's fastest battery-powered portable, while the AC-driven 20-MHz T5200 employs a fast 80386 processor backed by disk caching to speed I/O for your choice of a 29ms 40MB or a 25ms 100MB hard drive.

Cypress 2

Lantana's Token-Ring Card Masters the Micro Channel

Years ago, as it watched the corporate data processing burden shift downward, IBM concluded that the humble desktop CPU would need a little help from its friends. Big Blue's answer is the PS/2's Micro Channel Architecture, which can offload some of the CPU's work to busmasters—add-in processors that intelligently share the PC's resources.

But as we celebrate the PS/2's third birthday, precious few busmasters are around to lend a helping hand. That makes Lantana's Cypress/2 token ring network adapter a standout.

If you're an MIS director or a PC manager whose networking color scheme is predominantly Blue, the Cypress/2 will let your in-house clients exploit MCA's bus arbitration capabilities to send messages around their nets and still keep crunching spreadsheets or sorting data bases. The Cypress/2 could be especially useful for passing data back and forth between LANs and the company's IBM mainframe (you know what kind of a line forms at that water cooler).

(continues)

Premium 386/25, Premium/386C, Workstation/386SX

AST 386s Cache In for Performance

The script is familiar: Exotic new technology aimed initially at the most power-hungry applications quickly becomes standard for a whole range of uses. AST Research's new memory-cached 386- and 386SX-based machines are squarely in the middle of the developing 386 scene.

AST's brightest new star is the Premium 386/25. With 25-MHz clock speed and 32K of zero-wait-state cache memory, the 386/25 could relegate minicomputers and workstations to understudy roles in computer-aided design and engineering, file serving, and financial modeling. The new desktop also picks up speed in its three-lane SmartSlot bus—which includes a 32-bit dedicated pathway from CPU to memory, a standard AT bus, and an AST arbitration bus that will allow it to master multiple intelligent coprocessors when and if they are developed.

The 386/25 motherboard holds the ROM BIOS, a controller for three floppies, two serial ports, and one parallel port. The CPU, Intel 82385 cache controller with 32K, 1MB SIMM sockets, and a socket for either an Intel 80387 or a Weitek 3167 floating-point coprocessor are all housed on a dedicated 32-bit card. One 8-bit and two 8/16-bit slots, plus one 8/16-bit and two 8/16/32-bit Smartslots, are available for add-ins.

The standard 2MB memory can be expanded to 4MB on the CPU card, with another 16MB of 100ns memory available on each of two optional 32-bit memory adapter cards. Prices start at $6595 for one 5¼-inch floppy, $8995 with a 90MB 18ms hard drive, $9795 with a 150MB drive, and $11,795 with a 320MB drive.

AST's former top-of-the-line Premium/386 computers will get the hook, to be replaced by Premium/386C models. The *C* stands for memory caching, which boosts system performance by as much as 30 percent. Meanwhile, prices are falling by as much as $2000. The 20-MHz Premium/386C's memory cache is 64K of 25ns static RAM, and its bus architecture is the same as the 386/25's, but the 386C is limited to 16MB of memory on one 32-bit card.

Only the diskless Model 300, priced at $4195, will survive from the former 386 line. The new line starts with the 1MB, floppy-only Premium/386C Model 300, retailing for $4395. The Model 340, with a 40MB hard drive, costs $5495. Units with 2MB of memory and hard drives of 90MB, 150MB, or 320MB capacity list for $6995, $7795, and $9795, respectively.

Finally, the Premium Workstation/386SX is an 80386SX-based machine offering a lower profile *(continues)*

Each of AST's new cast of 80386-based computers includes at least 32K of zero-wait-state memory caching that enhances performance by as much as 30 percent.

Cypress/2

(continued)

The Cypress/2 uses the Texas Instruments token ring interface chipset and 2K of memory to relieve the PS/2's CPU of menial networking tasks—jobs like accepting and passing net control tokens and monitoring message addresses. Lantana adds its own discrete logic chips so the on-board processor can act as a busmaster controller.

The 16-bit card transfers data at a standard 4 megabits per second, and the company plans to offer a 16-mbps token ring implementation.

Lantana also sells an optional $75 daughterboard with software burned into a 32K EPROM module, and a remote-program–loading EPROM that lets you work with diskless workstations.

The Cypress/2, which retails for $795, comes with installation software and drivers for all versions of Novell *NetWare* and works with IBM PC LAN drivers. Lantana Technology Inc., 4392 Viewridge Ave., Ste. A, San Diego, CA 92123; 619/565-6400. —*Mark Henricks*

Reader service no. 733

The Cypress/2 token ring adapter takes advantage of Micro Channel bus arbitration to relieve the host CPU of menial networking tasks like accepting and passing net control tokens and monitoring message addresses.

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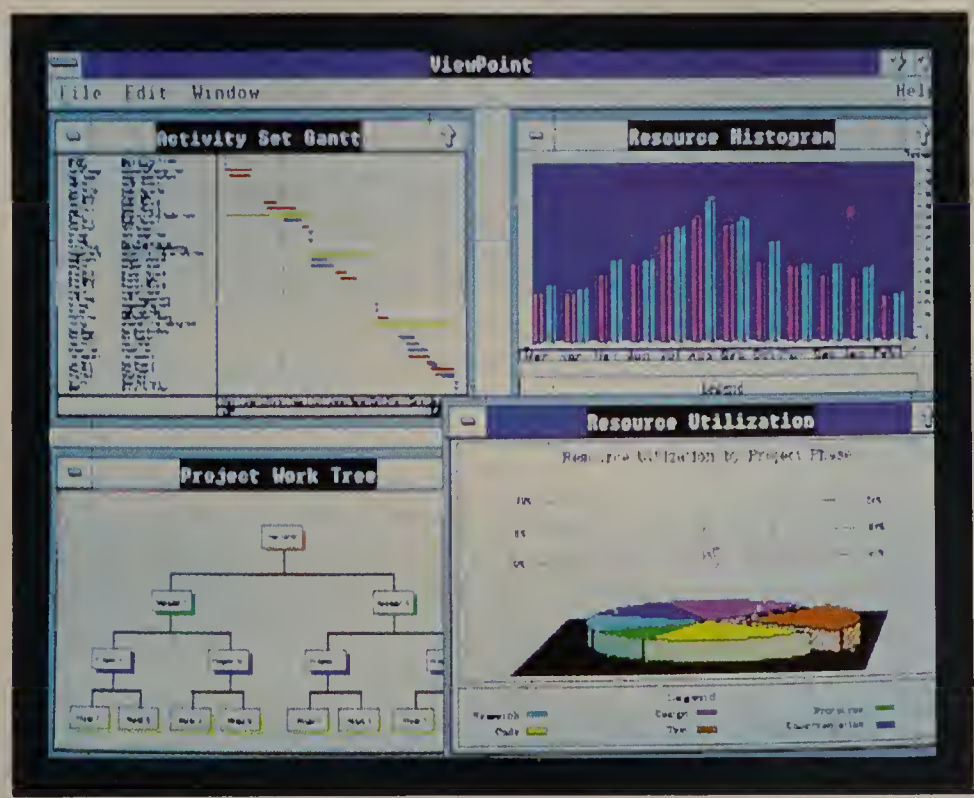

PC MAGAZINE Editor's Choice

ViewPoint is the acclaimed **project management** program designed to manage multiple projects, across divisional boundaries, using the same resources.

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INFO WORLD
BEST IN ITS CLASS

Circle 46 on reader service card

ViewLink

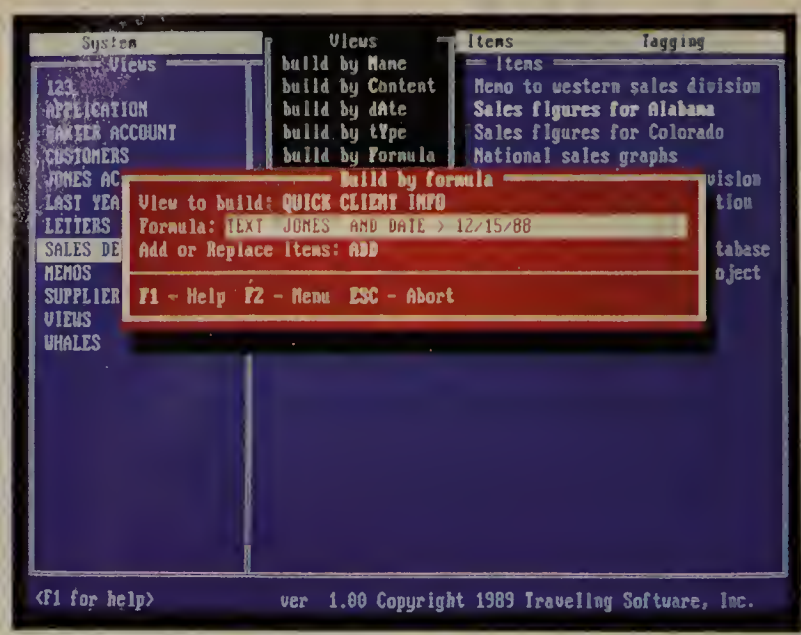
Grab Any Program's Data —Fast

One fine day when the boss comes in and asks for the report/file/budget calculation/whatever created six months ago, it's great to know that it's housed securely on your 40MB hard drive.

On the other hand, that's a big house. Even while you're tossing off a casual "no problema" to your two-fisted manager, your mind is feverishly ransacking subdirectories and subdirectories of subdirectories, trying to remember whether it was a nook or a cranny in which you stashed this suddenly vital data tidbit.

At that point, you can either scroll through megabytes of word processing, spreadsheet, and data base files—manually entering and exiting the necessary applications—or you can let Traveling Software's *ViewLink* do it for you.

ViewLink isn't a text-search program, a DOS shell, or an indexing utility, although it combines some benefits of all three. The manufacturer calls it a data/program linker, and it neatly addresses the common problem of being unable to find a tree for the forest. When installed, *ViewLink* automatically identifies subdirectories, applications, and files on your hard disk or disks and makes them "views," while the files that they contain are shown as the associated "items" on *ViewLink*'s main menu.



The ViewLink data/program linker finds important files on your hard disk and then loads the applications with which they were created for easy viewing.

You can change any item into a view and vice versa, and associate any number of items and views, even those from disparate applications—that's where the real power lies. For example, you could make '1989 Forecast' into a view; when you place the cursor over those words on the view list, another list of linked item files (word processing documents, data base records, spreadsheets, even graphics files) appears on the right. The program lets you link files by content, date, type, or any other attribute that triggers your memory.

Place the cursor over the item you want, press <Enter>, and you're automatically in the appropriate application, with that crucial answer just seconds away. *ViewLink* supports more than 50 applications, from *AskSam* to *WordStar 5.0* and *XyWrite III Plus*.

ViewLink thus helps you link all your programs and data in an associative way that could greatly increase your access to all that hard-won data. The $149.95 RAM-resident program operates in 60K of memory but requires a machine with DOS 2.0 or a later version and 384K of memory. Naturally, you need a hard disk to get maximum utility from the program. Traveling Software Inc., 18702 North Creek Pkwy., Bothell, WA 98011; 800/343-8080.

—*Mark Henricks*

Reader service no. 731

AST

(continued)

and price. The basic 16-MHz SX features a 32K cache, 1MB of memory, and a choice of a 1.2MB 5¼-inch or 1.44MB 3½-inch floppy for $3195. With 40MB or 110MB drives, the price is $4195 or $5195, respectively.

The Workstation/386SX's slim profile allows for only two 8/16-bit slots, but a measure of expandability is preserved by its highly integrated motherboard, where you can install up to 6MB of high-density memory modules. The same board holds one parallel and two serial ports and video and disk controllers.

All the new AST machines include a 101-key keyboard, DOS 3.3, GW BASIC, and a bundle of software utilities. Monitors are optional, as are AST's no-slot video modules. AST Research Inc., 2121 Alton Ave., Irvine, CA 92714; 714/863-1333.

—*Mark Henricks*

Reader service no. 732

GammaFax Communications Professional

Multi-Fax Solution for Networks

A PC-based fax board here and there can help whittle down the line at the office facsimile machine, but workers at many offices are beginning to reach for the fax machine as often as they do the telephone.

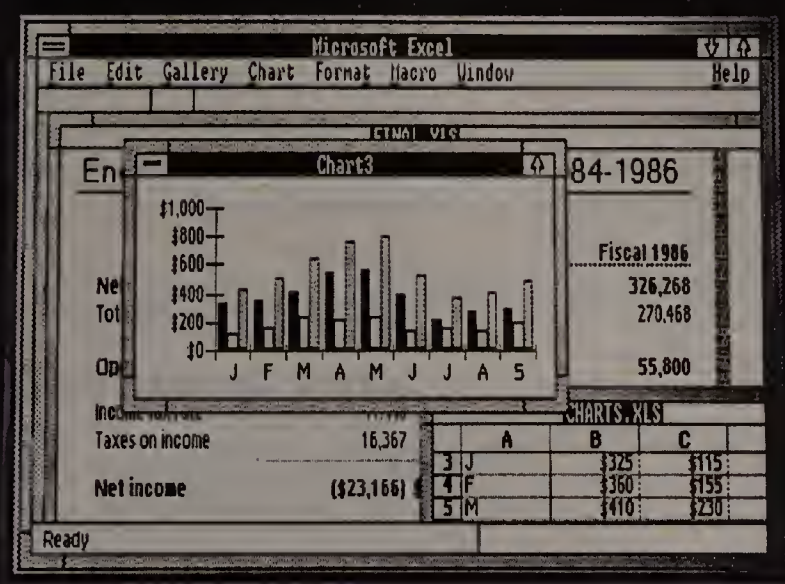
If your office fax machine can't keep up with the demands of the work group, it may be time to look at a multiuser fax solution. A GammaFax Communications Professional (CP) internal fax modem can spread fax messages across a network or team up with several of its peers to slice up a massive fax job.

As many as eight GammaFax CP boards can be installed in a single PC or across a network to send and receive multiple fax messages or high-speed file transfers. The GammaFax CP transmits documents directly from the host PC to any CCITT

(continues)

M I T S U B I S H I

What's black & white & read all over?



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The Mitsubishi® mp286L laptop personal computer.

Here's the first laptop that doesn't make you compromise. In readability. Speed. Power. Expandability. Or all of the above.

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The powerful 12MHz 80286 processor, with a 40MB internal hard disk for EGA graphics and numerous productivity options give the mp286L more capability than most desktops.

Best of all, you don't have to compromise quality. The mp286L is built like a Mitsubishi: built to work long and work hard. And backed with systems support, training and applications assistance by your Mitsubishi reseller.

For the authorized mp286L reseller nearest you, call 1-800-556-1234 ext. 25 (in California, 1-800-441-2345 ext. 25) or write: Mitsubishi Electronics, Information Systems Division, 991 Knox Street, Torrance, CA 90502.

MITSUBISHI ELECTRONICS

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Circle 237 on reader service card

Multi-Fax
(continued)

Group III facsimile machine or to other CP-equipped PCs.

The GammaFax CP requires a full-size expansion slot and features an on-board Intel 80188 processor running at 10 MHz. Backed by 256K of memory (expandable to 512K), the on-board processor shoulders all of GammaFax CP's communications operations so that the fax board requires only 65K of host RAM and permits true background processing.

The fax modem transmits data at 9600 bps, providing a reported average fax throughput of 2 pages per minute. In addition to transmitting ASCII files, the CP converts outgoing .PCX, CUT, and TIFF graphics files to fax format, and restores incoming faxes made from those files to their original format. However, it can't transmit other kinds of files, even to another CP board.

The GammaFax CP also helps integrate PC-to-fax capability into network applications. For example, teamed with *NetRemote* software from Brightwork or *Faxway* from CompFax, the CP can send fax messages over Novell *NetWare*-based networks or connect 3Com's *3+Mail* electronic mail system to fax messaging systems.

The CP supports every graphics adapter from VGA down, including Hercules cards, as well as the Wyse 700 and Genius large-screen monitors. The CP is also compatible with standard scanner interfaces.

GammaFax communications software offers a message queue manager that schedules unattended fax transmissions, can be programmed to automatically retransmit undelivered faxes, and supports logging and diagnostic features that allow for detailed billing and usage reports. The GammaFax command language interface enables you to use the CP with any program that can generate an ASCII file.

The GammaFax CP includes the GammaFax software, an RJ-11 telephone jack, and connections for optional daughterboards. The GammaFax CP is priced at $1095. GammaLink, 2452 Embarcadero Way, Palo Alto, CA 94303; 415/856-7421.
—*Wes Nihei*

Reader service no. 734

GammaFax Communications Professional spreads the fax workload across a network, letting you send and receive fax messages in the background without disturbing your foreground application.

Toshiba's ExpressWriter301 is the first battery-operated printer to deliver letter quality output on the road, while the AC-powered ExpressWriter311 portable packs all the features of a high-end 24-pin dot matrix printer.

Toshiba ExpressWriter301, ExpressWriter311

Letter Quality Laptop Printing

While laptop computers now turn up all over the place, there hasn't been a corresponding boom in laptop printers. Diconix has a pair of 9-pin battery-operated models of unparalleled portability and fair print quality, but they're not necessarily designed for important business letters or full-blown reports.

Now Toshiba, a company that knows more than most about people's extra-office work habits, has set its sights on bringing you office-quality printing in the field or at home. Toshiba touts its new ExpressWriter301 as the first portable printer with 24-dot letter quality capabilities. The 301 uses non-impact thermal dot matrix technology to print on thermal, standard, or photocopier paper or transparencies from 4 to 8½ inches wide.

Weighing in at 4 pounds, the 301 is small enough to fit into many briefcases and office drawers. Its footprint is a mere 12.2 by 5.5 inches with a 3-inch profile. It runs on either built-in rechargeable NiCad batteries or its AC adapter. A full charge takes approximately 8 hours and is good for an hour of continuous printing at either 42 cps or 60 cps.

You can switch among the 301's five resident fonts—Courier, Prestige Elite, Draft, Condensed, and Proportional—in either Toshiba/Qume or Epson LQ emulation. Graphics resolution is adjustable up to 360 by 360 dpi, which exceeds the average fax machine's 200 by 200 dpi, assuring sharp transmission. Paper guides are built in, and a snap-in black ribbon does the printing. A 2K buffer and a parallel cable interface are provided; a carrying case is optional.

For those who can get by without the battery, Toshiba offers the Ex-
(continues)

OS/2 NEWS

A continuing report on advanced software for personal computers.

Get a free IBM OS/2-based version of Sidekick for Presentation Manager.

When you order IBM OS/2,™ you'll receive Borland's Sidekick,® free (while supplies last). Sidekick for Presentation Manager™ includes an easy-to-use planner, phonebook, calculator and notepad using the graphical interface. It gets you off and running with IBM OS/2 today.

Improved word processing software based on OS/2 is introduced by WordPerfect.

WordPerfect® has announced that a version of its best-selling word processor is now available for OS/2. The OS/2 version offers all the features of their popular MS/DOS® version while taking advantage of OS/2's capabilities, including multitasking. For additional information please call 1 801 225-5000.

Accountants get true multitasking via ACCPAC Plus and OS/2.

ACCPAC® Plus System Manager/2 is an accounting software package from Computer Associates International. It allows simultaneous execution of multiple accounting functions by using the protected mode of OS/2. This enables users to enter sales orders while concurrently performing payroll calculations and printing financial statements. In addition, thanks to the Virtual Memory Feature of OS/2, users can toggle between a number of applications without having to exit one program and load another. For additional information please call 1 800 531-5236.

Create exciting three-dimensional, dynamically developed maps using OS/2.

Mapmaking is easier than ever with MapViewer from Golden Software Inc. MapViewer uses OS/2 and Presentation Manager window screens to display two- and three-dimensional thematic maps. These maps can show population density or physical contours, and include shading. For additional information please call 1 303 279-1021.

Retailer begins use of OS/2 to monitor remote retail sales.

Host International has begun to use OS/2 to give computing capabilities to their individual concessions and to network shops with regional offices for daily downloading of sales and employee data. The internally developed system also provides for remote data entry, collection and reporting.

Developing graphics for OS/2 applications is made easy with Toolkit from Graphic Software Systems.

High-performance graphics on microcomputers are made possible with OS/2 Graphics Development Toolkit from Graphic Software Systems. This package supports all OS/2 features while maintaining source code compatibility with the DOS Graphics Development Toolkit. It allows dynamic loading plus workstation control. Functions for lines, arcs, polygons, circles, bars and advanced graphics are all part of the package. For additional information please call 1 503 644-6746.

Micrografx announces an easy way to port Windows applications to OS/2 Presentation Manager.

Micrografx® has introduced Micrografx Mirrors. This software development tool makes it easy to port any Microsoft Windows® application to the OS/2 Presentation Manager. It's currently being used successfully to port Micrografx Designer, Graph Plus, Draw Plus and Clip Art to OS/2. For additional information please call 1 800 272-3729.

Free OS/2 Application Guide available.

You can receive a 700-page OS/2 Application Guide that lists and describes over 800 identified applications for the OS/2 operating system. For a free copy of this guide call 1 800 IBM-2468, ext. 120.

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VGA Plus 16

Paradise Pushes the VGA Envelope

When you're painting and you get down to the fine details, you reach for a smaller paintbrush. When you're computing, you can plug in the VGA Plus 16 and boost a VGA's 640 by 480 resolution up to 800 by 600 pixels. This add-in from Western Digital Imaging maintains the VGA's 16 colors from a 262,144-color palette, even at the higher resolution.

You don't trade performance for extended resolution. Western Digital claims its board's 16-bit data path and 16-bit video BIOS offers four times the speed of the IBM PS/2 Display Adapter, so you'll reach the end of your *AutoCAD* or desktop publishing to-do list faster.

VGA Plus 16 comes with drivers for *AutoCAD, Framework, Microsoft Windows* and *PageMaker, GEM* and *Ventura Publisher, WordPerfect,* and *WordStar.* The $499 VGA Plus 16 runs on all 80286 and 80386 AT–bus machines as well as on PS/2 Models 25 and 30. If there is a memory allocation conflict with the 16-bit BIOS—which may happen with an Intel AboveBoard or an Ethernet network card—the VGA Plus 16's AutoSense feature automatically steps down to 8-bit mode. Western Digital Imaging, 800 E. Middlefield Rd., Mountain View, CA 94043; 415/960-3353. —*Mark Henricks*

Reader service no. 736

The Paradise VGA Plus 16 offers 16 colors from a palette of 262,144 at 800 by 600 resolution as well as the blazing speed of a 16-bit data path and a 16-bit video BIOS.

Toshiba

(continued)

pressWriter311, a 24-pin dot matrix printer whose 15.7-by-12.5-by-4.8-inch footprint and 11 pounds are well below those of its full-size brethren. It offers a retractable handle for portability and more paper-handling capabilities than the 301, such as a detachable tractor, friction feed, and automatic paper loading. The 311 accommodates three copies plus the original.

Top speed is 180 cps in draft mode, 60 cps in letter quality. A generous 16K buffer speeds data throughput from the computer. A Centronics parallel interface is standard, and a serial interface is optional. A black fabric ribbon should last for up to 2 million characters.

The 311 emulates the same printers as the 301, plus the IBM Proprinter. Standard fonts are the same as the 301's, and a variety of font cards and downloadable disk fonts are available. A one-year parts and labor service warranty comes with each model. List prices are $489 for the 301 and $589 for the 311. Toshiba America Inc., Information Systems Division, 9740 Irvine Blvd., Irvine, CA 92718; 714/583-3000. —*Glenn Grant*

Reader service no. 735

Megamate

3½-inch Drive Eases Transition

The shift from 5¼-inch to 3½-inch floppy drive formats continues, but at a painfully slow pace. Micro Solutions may help you make the transition to the shirt-pocket media.

The company's Megamate is a pint-size 3½-inch drive that needs only a small spot atop your PC or desktop and runs either 720K or 1.44MB floppies. Only 4 inches wide, 1.5 inches tall, and 7.5 inches long, Megamate comes with its own half-size controller card, cable, and installation software, which requires 128K of memory and DOS version 2.0 or higher. Answer the installation software's four simple questions, and you're up and running.

With an average access time of 120ms, Megamate will seem somewhat slower than your regular 5¼-inch floppy drive and much slower than your hard drive, but at $349 the price is right, and Megamate carries a one-year warranty on parts and labor. Micro Solutions Computer Products, 132 W. Lincoln Hwy., De Kalb, IL 60115; 815/756-3411.

Reader service no. 738

Micro Solutions' 3½-inch Megamate drive can help you make the transition to shirt-pocket media, taking only an 8-bit slot and offering compatibility with both 720K and 1.44MB floppies.

SEE THE FULL SPECTRUM

SOTA VGA/16 Delivers It.

SOTA Technology — *a pioneer in accelerator board technology — now brings high-speed, high-resolution graphics to your PC.*

SOTAVGA/16 is designed to optimize the performance of all popular software. Its' industry leading 16-bit memory and BIOS interface, is designed to take advantage of the extra performance offered by 286/386 machines. In fact, speed increases of up to 400% faster than the IBM VGA are realized.

In addition to being faster, SOTAVGA/16 also gives you more colors and resolution than IBM VGA. Base configuration includes 256K of video memory, enough memory for 800 × 600 resolution with 16 colors. Plus, it's upgradeable to 512K — simply plug in the extra memory chips. With 512K you get 1024 × 768 resolution in 16 colors or 800 × 600 in 256 colors. Software drivers are included for all your popular programs.

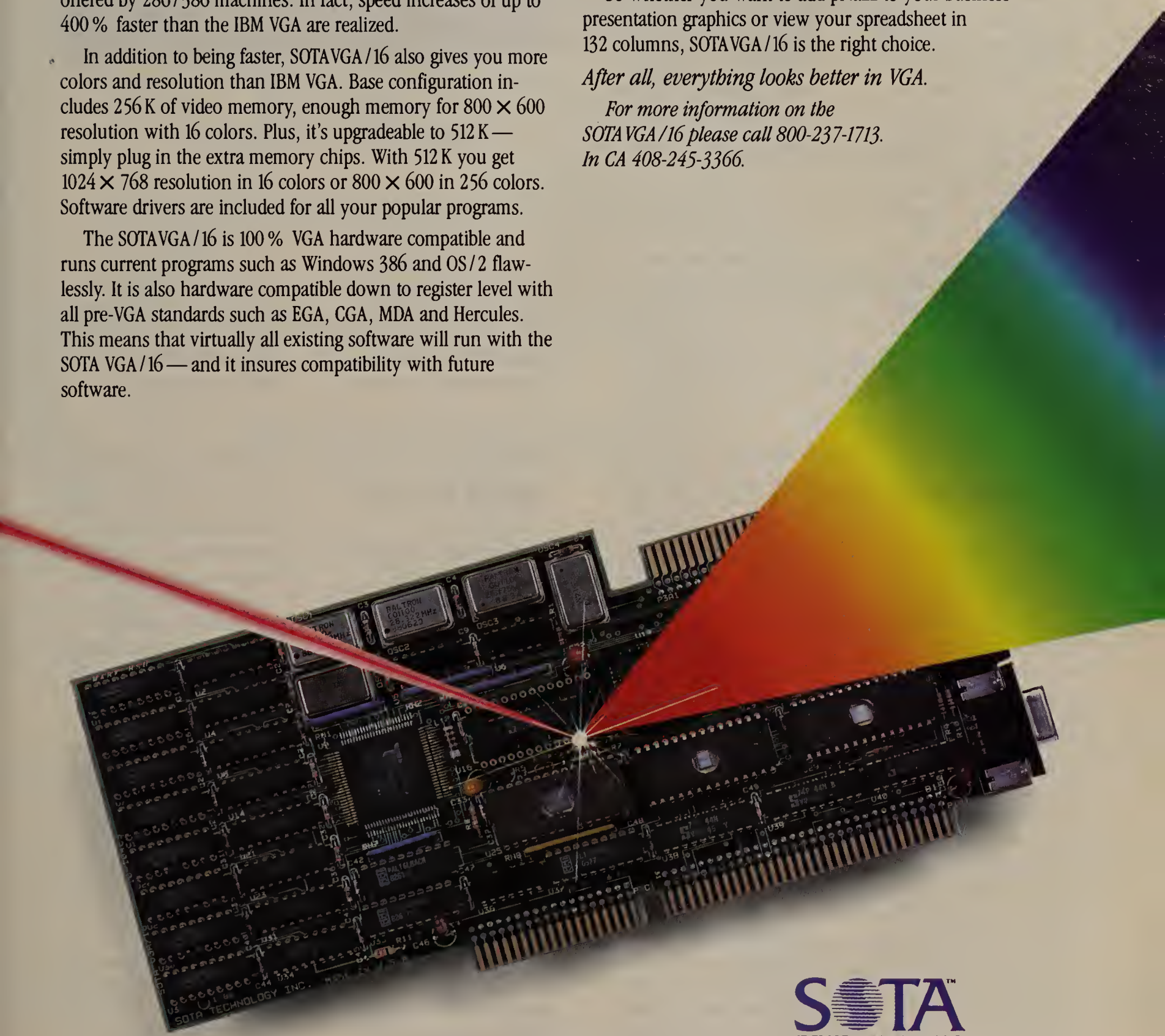
The SOTAVGA/16 is 100% VGA hardware compatible and runs current programs such as Windows 386 and OS/2 flawlessly. It is also hardware compatible down to register level with all pre-VGA standards such as EGA, CGA, MDA and Hercules. This means that virtually all existing software will run with the SOTA VGA/16 — and it insures compatibility with future software.

SOTAVGA/16 has two output connectors for full analog and digital monitor support — not just analog, as some manufacturers offer. And, since many of today's programs require a mouse, SOTA built this option right on the board. No longer do you have to compromise an extra slot or sacrifice one of your COM ports to install a mouse. Simply plug it into SOTAVGA/16.

So whether you want to add pizazz to your business presentation graphics or view your spreadsheet in 132 columns, SOTAVGA/16 is the right choice.

After all, everything looks better in VGA.

For more information on the SOTAVGA/16 please call 800-237-1713. In CA 408-245-3366.



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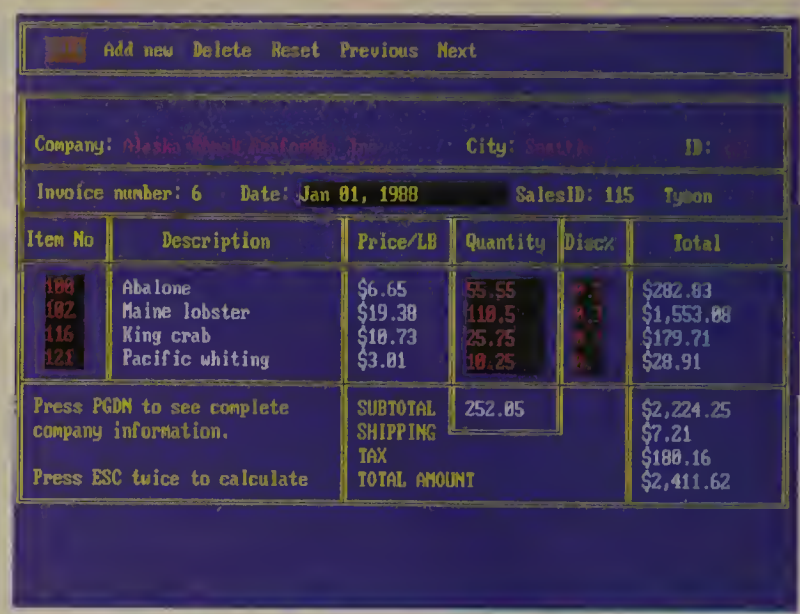
Circle 248 on reader service card

R:macros

R:base Helpers Take the Drudgery Out of Data Base Chores

With *R:macros*, a collection of 60 macros, utilities, and templates, you can automate your *R:base* data base tasks and speed application development. *R:base* has enough power for any data base application, but that power demands a commensurate degree of complexity. The $99 *R:macros* collection simplifies your job with a collection of the most-requested ready-to-use macros and templates for a variety of activities—from splitting imported data fields to trapping error messages in an application. Financial math functions help you automate such activities as calculating future or present value for a payment series.

Among the utilities, one lets you globally change a column name across many different tables, forms, and report definitions. Another utility creates a help window you can use to scroll through a target field for a value rather than having to scroll through all the records. You can make your reports look the same as your data entry forms, and Microrim has included sample reports for tasks such as creating aged accounts receivable or mailing labels.



R:macros is a collection of 60 macros, utilities, and templates that help automate R:base tasks and speed application development by offering, among other benefits, greater control over your forms.

In addition to a library of reusable code, *R:macros* includes complete instructions for maximizing its use, programming tips, and routines that can demonstrate how you can improve your own reports' print quality. *R:macros* runs within *R:base* and so requires DOS 2.0 or higher and 512K of memory. Microrim, 3925 159th Ave. NW, Redmond, WA 98073-9722; 206/885-2000.
Reader service no. 739

Fast

Speed Up I/O

Future Computer Systems has introduced a disk caching utility that it claims increases application throughput by a factor of 4 to 60, depending on how disk intensive the application. *Fast* achieves its speed through a proprietary logic scheme that anticipates what data the computer's CPU will request next, reading it into an area of RAM one track at a time before the CPU asks for it. Rather than update its cache at regular intervals, *Fast* does so as needed, writing to the cache during the CPU's idle moments. Future's engineers also have found a way to write to cache in 32-bit word increments, even with an 80286.

The company claims a read hit rate of 80 to 98 percent—depending on amount of memory allocated—compared to 40 to 70 percent for standard disk caches. The lower figure could be achieved with as little as 384K, while the upper performance level requires 1MB of memory.

Fast, which sells for $99, requires DOS version 2.1 or later and about 156K of memory to maintain a 128K buffer in conventional extended memory. If you have expanded memory, *Fast* runs from an 8K kernel, keeping the rest in high memory. Future Computer Systems, 26 Keewaydin Dr., Bldg. H2, Salem, NH 03079; 603/894-6975.
Reader service no. 740

dBOOST

dBASE Booster

Isogon Corporation has released a memory-resident utility that it claims speeds up *dBASE* applications. Execution can be boosted by up to 60 percent, depending on the application mix and type, although improvements average between 35 and 50 percent. *dBOOST* focuses on the read/write portions of applications, with the best performance results for heavy random or indexed reading and writing on large data bases. Once installed, the software is automatic and invisible to the user, requiring no commands or special file treatment.

dBOOST works with all versions of *dBASE* from *dBASE III* on up, using a combination of proprietary processing techniques and user-specifiable buffering to do its work. It doesn't modify data or program files.

The $69.95 program requires as little as 20K of memory with a 12K buffer, but the more memory you devote to it, the faster your applications will run. If expanded memory is available, *dBOOST* will use only 9K of conventional memory and create a user-specified buffer of between 16K and 64K in expanded memory. *dBOOST* requires DOS 2.0 or a later version. Isogon Corp., 330 Seventh Ave., New York, NY 10001; 212/967-2424.
Reader service no. 741

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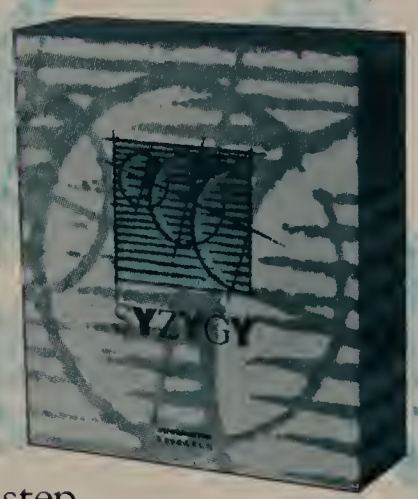

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TurboTax Personal/1040

Taxation Without Frustration

The 1988 tax year edition of *TurboTax Personal/1040* not only keeps pace with the Internal Revenue Service's unending quest for the perfect form, it also includes new features designed to help the average working person untie the Gordian knot.

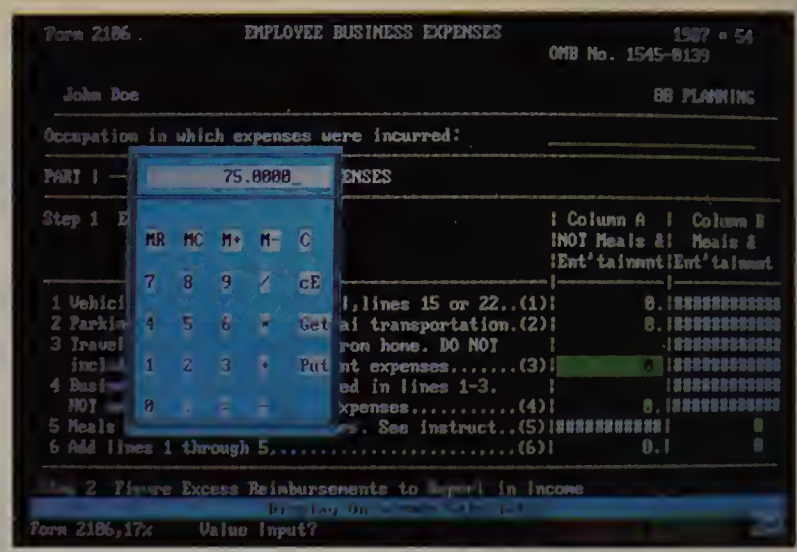
Not a year goes by that the IRS doesn't change both the forms and the rules—in an effort to simplify the process. This year's *TurboTax* reflects all 17 major rule changes and the myriad minor forms changes. It also introduces several helpful features such as auto-interview, which enables you to figure out which tax forms you'll need.

Fill in the personal data sheet, and *TurboTax* automatically transfers the information to corresponding boxes in all appropriate forms; as always, a change in one is reflected throughout the program. In fact all the data sheets are clearer and more comprehensive than before, and *TurboTax*'s on-line help pops up with information appropriate to whatever line in whatever form you're stuck in.

To further spare you from keying in data, the new interface command lets you pull in ASCII data from other personal accounting programs such *Quicken*, *Managing Your Money*, and *Dollars and Sense*.

Nothing can make tax returns painless, but *TurboTax*'s new Visual 1040 makes the form clearer. It's a bit-mapped version of the core 1040 form designed for those with 384K of memory and any graphics adapter from CGA to VGA, including the Hercules Graphics Card. You also can opt for the usual character-based screen graphics.

If you would like a professional to look over your calculations, check the appropriate box on your registration card; ChipSoft will send a list of five tax preparers in your area who use the company's professional preparer version of the program. Or if time is more important to you than money, you can use the 1040A short form now included.



TurboTax Personal/1040 automatically copies pertinent information from a line of one tax form onto the appropriate lines in other forms. It includes pop-up features, such as a calculator, for your convenience.

Without the Visual 1040, *TurboTax* requires DOS 2.0 or a later version and 256K of memory. It retails for $75, and versions are available for 41 states at $40 each. ChipSoft, Inc., 5045 Shoreham Pl., San Diego, CA 92122-3954; 619/453-8722.

Reader service no. 742

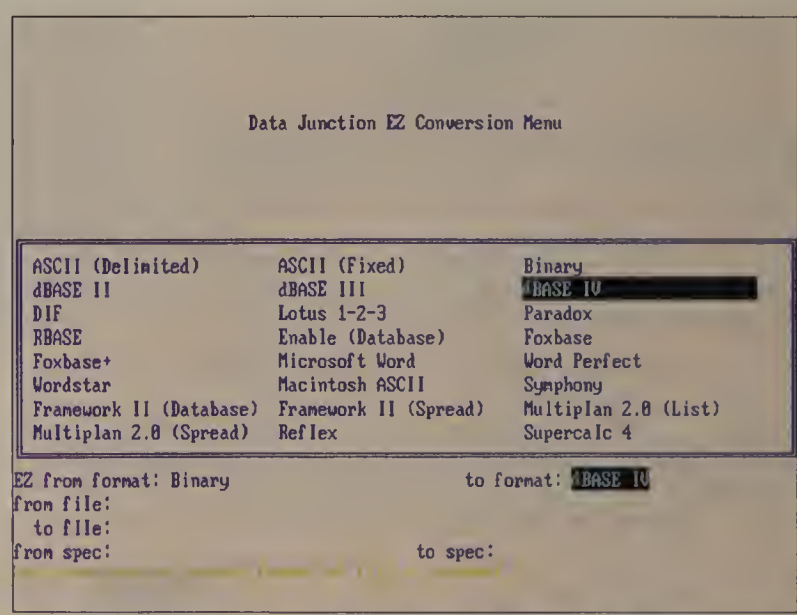
Data Junction 3.0

Universal Data Exchange

As PC applications have proliferated, so have their file formats. Today we have a veritable alphabet soup of incompatible and overlapping file suffixes. Version 3.0 of Tools & Techniques' *Data Junction* has more than two dozen new ways to unscramble the letters, enabling you to convert your binary files back and forth between an equal number of data base, spreadsheet, and other control-code applications.

Relying on a hub-and-spoke architecture in which each format represents a spoke, *Data Junction 3.0* has added several new spokes, including *Oracle*, *dBASE IV*, and Novell BTrieve. It's also five times faster than past versions, converting 5000 records a minute. But most of its new features are enhancements to the way that you treat data within the hub.

(continues)



Data Junction's hub-and-spoke architecture lets you convert binary files back and forth between two dozen data base, spreadsheet, and other control-code applications.

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1dir Plus 3.02, Muscle 3.02

File Manager Works New Wonders

With version 3.02 of Bourbaki's *1dir Plus* DOS shell, you no longer need to worry about obliterating the latest version of a file along with its predecessor when copying between hard disk subdirectories or floppies. *1dir Plus* lets you display two subdirectories simultaneously, while the Compare+ command automatically takes the latest versions of the files that you mark and copies them to the appropriate subdirectories, eliminating the second-largest inconvenience of carrying work home.

An enhanced editor pops up for viewing and editing ASCII or hexadecimal files; the size of files you can edit is limited only by available memory. *1dir Plus* scans your hard drives and automatically installs popular applications and utilities into its menu and custom command library, which you can later edit to suit yourself. The program now supports Microsoft-compatible mice, and a tree directory displays the files and the amount of space occupied by individual subdirectories across an entire drive.

Version 3.02 preserves its multiple security options, including menu-level and command-level security critical for networks; version 3.02 of the *Muscle* compiler lets work-group system developers add their own commands to *1dir*'s command library.

The new version of 1dir Plus lets you display two subdirectories simultaneously, while the Compare+ command automatically copies the latest versions of the files that you mark to the appropriate subdirectories.

Muscle offers a variety of programming functions, including variable types, Boolean logic, and the ability to change a command library.

Muscle retails for $50 by itself or in a $145 bundle with *1dir Plus*, which retails alone for $95. *1dir Plus* can use expanded memory, leaving only 7K in conventional memory when you run another application, and clears from memory in a keystroke. It requires DOS 2.01 or a later version and 256K of memory. Bourbaki, Inc., 615 W. Hays St., Boise, ID 83701; 208/342-5849.

Reader service no. 744

Twist & Shout 1.09

Sidelong Glance at Worksheets

The Software Toolworks' *Twist & Shout* now provides sideways printing, banner creation, and print spooling add-ins for *Symphony*, *Framework*, and *VP-Planner Plus* as well as for *1-2-3* and *Quattro*.

The new version of *Twist & Shout* runs faster and supports a mouse, color, and more fonts and special printing effects. The Software Toolworks claims that its program works with more than 500 printers.

Twist & Shout can print wide worksheets and text files sideways or a banner with characters up to 1 foot tall or covering up to 6 lines in four type styles. It also includes a small graphics library. A disk-based print spooler lets you get on with your work while *Twist & Shout* prints in the background.

Twist & Shout retails for $79.95 and requires DOS 2.0 or a later version and 384K of memory. The Software Toolworks, 19808 Nordhoff Pl., Chatsworth, CA 91311; 818/885-9000.

Reader service no. 745

Data Junction

(continued)

In general, transferring data between spreadsheets and data bases is more complicated than swapping word processing files. *Data Junction 3.0* includes filtering logic so that you can pick out the records you want using a record number or range of numbers, as well as with Boolean algebra. The hub's editing capabilities have been improved so that you can add or subtract fields, make them larger or smaller, and do column-oriented search-and-replace operations. You can then save these changes and overlay them on other data.

Data Junction's ability to take in mini and mainframe data has been beefed up. Additionally, you can now automatically enter long text strings in a field, such as a name, using a single-key macro.

Data Junction 3.0 retails for $195. It requires DOS 2.0 or a later version and 512K of memory. Tools & Techniques, Inc., 1620 W. 12th St., Austin, TX 78703; 512/482-0824.

Reader service no. 743

Wes Nihei is an assistant editor for PC World, *Mark Henricks a Dallas-based contributing editor, and Glenn Grant a frequent contributor.* ●

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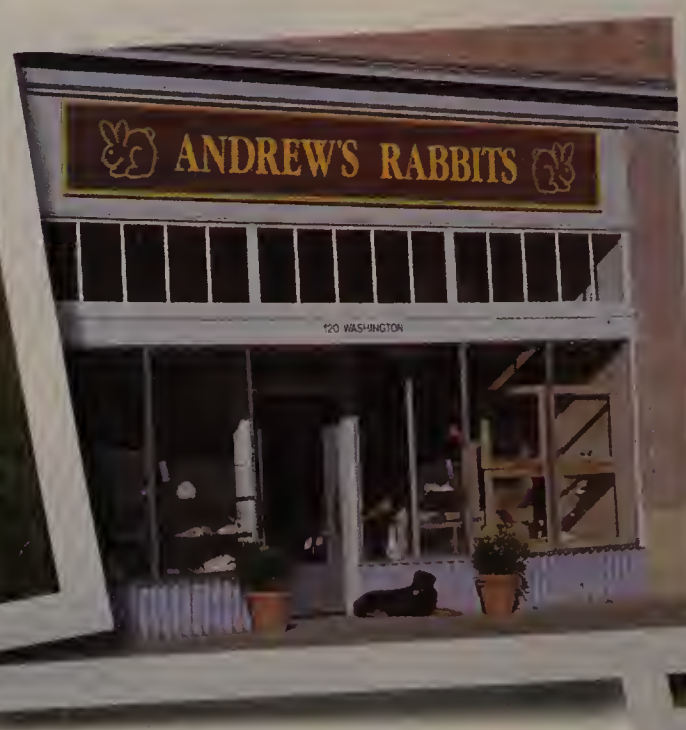

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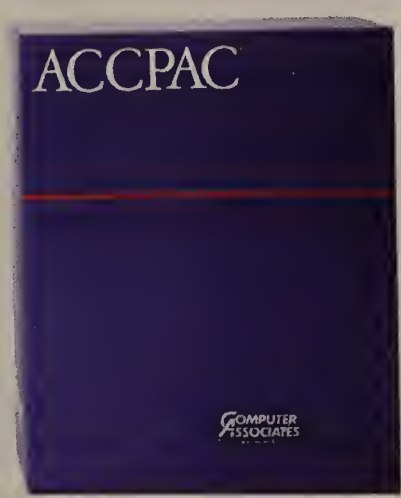

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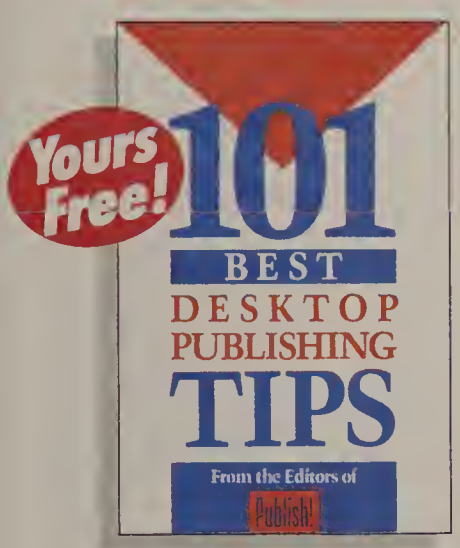

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The market for mobile computers is really two markets. Some people want temporary computing ability as they shuttle between desktops, requiring little more than battery operation and light weight. But when a computer has to run on a battery, some tradeoffs in performance and expansion capability are hard to avoid. This is bad news for business users who need computers good enough to use all day and portable enough to take home at night. For these users, the AC-powered transportable computer is the answer.

Powerful transportables are more available than ever. To help you make the smartest buy, *PC World* and National Software Testing Laboratories (NSTL) have taken a comparative look at the top eight: five 80286s (Compaq's Portable III, the GridCase 1520, NEC's PowerMate Portable, Ogivar's 286, and Toshiba's 3200) and three 80386s (Compaq's Portable 386, the GridCase 1530, and Toshiba's 5200).

Smart shoppers will weigh five characteristics before laying their money down: speed, price, transportability, expandability, and ergonomics.

When it comes to speed, the current crop of transportables perform as well as or better than many desktop systems. By and large, performance on NSTL's benchmarks was directly related to CPU speed—as was price, which ranged from $6070 to $9687. With one minor exception, every machine passed the NSTL Crash Test with flying colors.

When you have to lug a machine home every night, you quickly learn the difference between the manufacturer's advertised weight and the actual traveling weight, including modem and power cord. The weights listed here are traveling weights. The 14.5-pound GridCases were the lightest machines reviewed; the 25-pound NEC PowerMate was the heaviest.

All transportable keyboards are not created equal. The smaller the system, the harder it is for the designers to create a standard keyboard. Many machines, like the Ogivar, place familiar keys in unfamiliar locations, and their embedded numeric keypads require you to hold down some special key in order to get <Page Up>, <Page Down>, or a number. A few, like Compaq's Portable III, boast excellent keyboards that are as easy to use as standard desktop units'.

Those who plan to run RAM-hungry applications such as OS/2 and *Windows/386* will want to look into CPU-speed memory capacity as well. Most of these systems have special memory expansion slots (or space on the motherboard) to let the CPU access expansion RAM at full speed. Any additional memory has to be installed in standard 8-MHz slots—either built in or in an optional expansion chassis—which slows memory access, degrading performance.

In order to provide meaningful price comparisons, all eight machines (with a few variations noted in text) were set up in the standard *PC World* transportable configuration: at least 2MB of RAM, a 40MB hard disk, one floppy drive, a 2400-bps internal modem, one serial and one parallel port, and DOS 3.3. All eight were socketed for math coprocessors and provided ports for external keyboards, monitors, and floppy disk drives.

The 80286-based Toshiba 3200 and the 80386-based Toshiba 5100 share Best Buy honors for portability, performance, and eye-pleasing EGA displays.

JOHN GREENLEIGH

FEATURES EVALUATION

Top Transportables: Feature by Feature

Among the 80286s, the GridCase 1520 is tops for portability, while the Toshiba takes the gold for its excellent EGA display, full keyboard, and slot expandability. In the 80386 department, the results are surprisingly similar: Grid Systems' 1530 is the easiest to schlepp around, and the Toshiba 5100 impresses with the best display (and the lowest price).

● Yes
○ No
◒ Deficient

	Compaq Portable III	GridCase 1520	NEC PowerMate Portable	Ogivar 286	Toshiba 3200	Compaq Portable 386	GridCase 1530	Toshiba 5100
Standard features								
Price	$7660[1]	$7005[2]	$6070[3]	$7100[4]	$759B[5]	$9687[1]	$B255[2]	$759B[6]
CPU	B0286	B0C286	80286	80286	80286	80386	80386	803B6
Clock speed (MHz)	12	10	8/10	12.5	6/12	20	12.5	16
Coprocessor support	●	●	●	●	●	●	●	●
Disk-coching software included	●	●	○	○	○	●	●	○
Standard floppy drive	1.2MB	1.44MB	720K	720K	720K	1.2MB	1.44MB	1.44MB
Memory bus capocity	6.6MB	4MB	640K	2.6MB[7]	4MB	11MB	4MB	4MB[8]
Expandability								
8/16-bit expansion slots/number free	◒[9]	0	2/2	0	1/1	◒[9]	0	0
8-bit exponsion slots/number free	0	0	0	◒[9]	1/0	0	0	◒[9]
Portability								
Weight (pounds)	21.7	14.45	25	15.5	20.15	21.8	14.45	14.92
Volume (cubic inches)	1152	431	1155	728	885	1152	431	62B
Automotic head porking	●	●	○	○	●	●	●	●
Ergonomic design								
Disploy								
Screen type	gas plasma	gas plasma	backlit LCD	gas plasma	gas plasma	gas plasma	gas plasma	gas plasma
Mode	CGA[10]	CGA[10]	EGA	EGA	EGA	CGA[10]	CGA[10]	EGA
Screen tilt (degrees)	30	120	35	135	135	30	120	140
Switchless installotion	○	●	○	●	○	○	●	○
Complete documentotion	●	●	●	●	●	●	●	●
Dedicoted number pad	●	○	●	○	●	●	○	○

[1] Price based on 2MB RAM, 40MB hard drive, 5¼-inch 1.2MB floppy drive, gas plasma CGA-compatible display, 2400-bps internal modem, one serial port, one porallel port, and DOS 3.3.

[2] Price based on same configurotion as in footnote 1, except with 20MB hard drive and 3½-inch 1.44MB floppy drive.

[3] Price based on same configuration as in footnote 1, except with backlit LCD EGA-compatible display and 3½-inch 720K floppy drive.

[4] Price based on same configuration as in footnote 1, except with EGA-compatible display and 3½-inch 720K floppy drive.

[5] Price based on same configuration as in footnote 1, except with 4MB RAM, EGA-compatible display, and 3½-inch 720K floppy drive.

[6] Price based on same canfiguration as in faotnote 1, except with EGA-compatible display and 3½-inch 1.44MB floppy drive.

[7] 4.6MB without modem installed.

[8] 6MB without modem installed.

[9] Expansion slots available in optional expansion unit.

[10] 640 by 400 graphics mode for some applications.

80286 TRANSPORTABLES

Compaq Portable III

Compaq's 12-MHz Portable III is a solid, reliable, suitcase-shaped machine that features outstanding memory expandability, the best keyboard in the roundup, and Compaq reliability. But it's been out for two years—a long time in this volatile market—and in many ways it's been left behind. (For a review of Compaq's latest laptop, the SLT/286, see *The Hardware Shelf* in this issue.)

At $7660 and 21.7 pounds (in the *PC World* configuration), the Portable III is neither inexpensive nor light. Its 16-by-8-by-9-inch bulk (1152 cubic inches, or in^3) ties for biggest in the roundup, and it offers only CGA graphics. Its 1.2MB 5¼-inch floppy drive also marks it as an older machine; most newer systems use smaller, more reliable 3½-inch drives.

Memory expandability is among the Portable III's greatest strengths. Although only 640K of RAM can be placed on the motherboard, you can add 6MB more via a special memory board to reach a maximum of 6.6MB—all of which can be accessed at CPU speed. An optional ($199) piggyback unit provides two 8/16-bit AT expansion slots.

Thanks to its 12-MHz CPU and a 26ms hard disk, the Portable III zips along. It took second place on NSTL's performance benchmarks for all the 286 transportables tested.

EXECUTIVE SUMMARY

Compaq Portable III

80286 transportable

Excellent memory capacity, the best keyboard in the roundup, and Compaq reliability are pluses; heavy weight, high price, and limited graphics are minuses.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity				●
Expandability			●	
Portability			●	
Ergonomic design			●	
Performance				●
Overall value				●

The III's gas plasma display is so bright that its narrow range of tilt adjustment isn't a limitation, and four distinct shades can be represented simultaneously. Its 400 scan lines present crisp characters in text mode. While its graphics mode offers an AT&T 6300–compatible 640-by-400-pixel resolution, only a few programs (*Framework*, *Windows*, and *VersaCAD*) can use it. Other graphics programs are relegated to CGA resolution, a serious drawback.

The Portable III's large size pays off in the keyboard department; it has the best one in the roundup. The detachable 91-key unit closely follows the familiar 101-key layout, with 12 function keys across the top and a dedicated cursor/numeric pad.

Software includes diagnostics and setup, a disk cache utility, and a memory-resident utility that lets you change color and implement inverse video and boldface on the fly.

The Compaq Portable III was a hot machine in its day, but that day is passing. Its memory capacity and performance are excellent, its keyboard is a treat, and Compaq's reputation for reliability is unquestionable; but given the Portable III's high price, large size, and heavy weight, it's not a smart buy.

GridCase 1520

The GridCase entries are the smallest, lightest transportables in the roundup. A good-looking machine with a low profile, black magnesium case, and bright-red display, the GridCase 1520 was among the first 286 clamshell transportables on the market—and it shows its age in several crucial ways. It's slow, competing with NEC for last place in the roundup, and, as with the Compaq, its crisp 400-scan-line text mode is offset by limited support for its 640 by 400 graphics. Moreover, since Grid's 40MB hard drive takes up both drive bays, you'll have to opt for a half-height 20MB unit unless you're prepared to give up a floppy altogether.

At $7005 (in the *PC World* configuration, except with a 20MB hard drive/1.44MB 3½-inch floppy combo), the 1520 is less expensive than any machine in the roundup except the

NSTL TEST REPORT

Compaq, Ogivar Win Transportables Speed Trials

Overall, Compaq's 20-MHz Portable 386 walks away with the top test scores. In the 80286 arena, the 12.5-MHz Ogivar takes the gold medal, with Compaq's 12-MHz Portable III coming in a close second.

Microsoft Word

80386 Transportables

	seconds
Compaq Portable 386	83
Toshiba 5100	98
GridCase 1530	133

80286 Transportables

	seconds
Ogivar 286	139
Toshiba 3200	151
Compaq Portable III	152
NEC PowerMate	173
GridCase 1520	176

seconds 0 200

1-2-3

80386 Transportables

	seconds
Compaq Portable 386	109
Toshiba 5100	138
GridCase 1530	189

80286 Transportables

	seconds
Ogivar 286	209
Compaq Portable III	225
Toshiba 3200	225
GridCase 1520	264
NEC PowerMate	264

seconds 0 300

AutoCAD

80386 Transportables

	seconds
Compaq Portable 386	70
Toshiba 5100	79
GridCase 1530	n/a[1]

80286 Transportables

	seconds
Ogivar 286	144
Toshiba 3200	164
NEC PowerMate	185
Compaq Portable III	n/a[1]
GridCase 1520	n/a[1]

seconds 0 200

dBASE III Plus

80386 Transportables

	seconds
Compaq Portable 386	72
Toshiba 5100	93
GridCase 1530	129

80286 Transportables

	seconds
Ogivar 286	129
Compaq Portable III	132
Toshiba 3200	136
NEC PowerMate	164
GridCase 1520	177

seconds 0 200

Microsoft C

80386 Transportables

	seconds
Compaq Portable 386	346
Toshiba 5100	427
GridCase 1530	529

80286 Transportables

	seconds
Compaq Portable III	595
Ogivar 286	606
Toshiba 3200	626
GridCase 1520	680
NEC PowerMate	732

seconds 0 800

[1] System doesn't support EGA.

Methodology
All machines were tested with a coprocessor and a 256K extended memory disk cache. The 20-MHz Compaq Portable 386 was configured with a 43MB hard disk and 4MB of RAM. The 16-MHz Toshiba 5100 was configured with a 43MB hard disk and 2.2MB of RAM. The 12.5-MHz GridCase 1530 was configured with a 21MB hard disk and 1MB of RAM. The 12.5-MHz Ogivar 286 was configured with a 44MB hard disk and 1MB of RAM. The 12-MHz Compaq Portable III was configured with a 21MB hard disk and 1MB of RAM. The 12-MHz Toshiba 3200 was configured with a 43MB hard disk and 4MB of RAM. The 10-MHz GridCase 1520 was configured with a 21MB hard disk and 1MB of RAM. The 10-MHz NEC PowerMate Portable was configured with a 43MB hard disk and 1MB of RAM.

Microsoft Word 4.0
A *Microsoft Word* macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

dBASE III Plus 1.1
The *dBASE III Plus* test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

1-2-3 2.01
In this benchmark, a *1-2-3* macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

Microsoft C 5.0
The *Microsoft C* benchmark measures the time required to compile and link *XLISP*, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

AutoCAD 9
In this benchmark, a three-dimensional sample drawing is retrieved and displayed using *AutoCAD*'s EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

low-end NEC PowerMate—but it still costs nearly $1000 more than the NEC. Checking in at a featherweight 14.5 pounds and a svelte 11.5 by 15 by 2.5 inches (431 in³), it includes a 25ms hard disk. You can install up to 4MB of RAM on the motherboard. Two special sockets for ROM chips are built in; ROMs with DOS, *Crosstalk*, and several other utilities are available.

The 1520's performance reflects its slow clock speed. On the other hand, it's worth noting that it still beats the original IBM Model 50 desktop.

The Grid's 8-by-6-inch high-contrast gas plasma screen is a knockout; it can display four shades, ranging from the blackest black to the brightest red of any screen I've ever seen. The bad news is the limited graphics support.

The 1520's keyboard is the worst in the roundup; it has only 72 keys, many of which have to perform double duty. Dedicated cursor keys and 12 function keys across the top make things a bit easier, but invoking <Page Up> or <Page Down> still requires 2 keys and both hands, and the numeric pad is embedded.

The GridCase comes with a disk caching utility, software for transferring data to and from a desktop machine, and *InteGrid*, which includes a desktop organizer, a text editor, a file manager, and a spreadsheet program.

The GridCase is designed for use as a battery-powered laptop or an AC-powered transportable. The power supply/charger has the same size and configuration as the battery pack, which it entirely replaces—no extra pieces or pounds to carry. The Grid's battery life is only 45 minutes, making it far more useful as a transportable than as a battery-powered laptop.

The GridCase 1520 is a beauty, but its functionality fails to match its form. Its appearance, size, and weight are impressive, and its battery option may come in handy for some—but its slow performance, clumsy keyboard, CGA display, and limited drive capacity keep it out of the winner's circle.

The GridCase 1530 is the lightest, prettiest, and most portable 386 in the roundup, but its 20MB hard disk and CGA display are below par.

JOHN GREENLEIGH

EXECUTIVE SUMMARY

GridCase 1520

80286 transportable

This featherweight system takes top prize for portability, and its price is fairly low, but its unimpressive performance, small 20MB hard disk, awkward keyboard, and limited graphics are major disappointments.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity			●	
Expandability		●		
Portability				●
Ergonomic design			●	
Performance		●		
Overall value		●		

NEC PowerMate Portable

The $6070 PowerMate Portable is the cheapest transportable in the roundup by close to $1000—but it's also the biggest, heaviest, and slowest, and it has the lowest CPU-speed RAM capacity (640K). Two nice touches are an EGA display and two standard AT-style 8/16-bit expansion slots.

The 10-MHz PowerMate Portable looks as if NEC started out to make a lunchbox but created a suitcase instead. It weighs 25 pounds and takes up 15 by 7 by 11 inches (1155 in³). Its 80286 CPU's speed may be switched from 8 to 10 MHz via keyboard or software. It comes with a relatively slow 35ms hard disk, and a 720K 3½-inch floppy drive.

As you might expect, the PowerMate's comparatively slow CPU and hard disk result in unimpressive performance. It came in last or next to last on every NSTL benchmark.

The PowerMate's 8-by-7-inch backlit LCD display shows sharp blue characters on a silver background. EGA graphics are supported, but only one shade of blue can be generated. This means software that depends on color or shades of gray may produce unreadable screens. DIP switches enable you to reassign colors globally (blue equals on, red equals off, and so on), but you should install your software for monochrome to get the best results.

The keyboard that comes with the PowerMate is very close to a standard desktop unit. It has 93 keys—more than any of the other machines' keyboards—with 12 function keys, 4 cursor keys, and a dedicated numeric keypad, all close to their familiar locations. Unfortunately, the touch is uncomfortably light and clicky.

The software package that accompanies the PowerMate is skimpy, consisting only of a TSR utility that lets you vary screen attributes on the fly (as opposed to the DIP switches, which govern color reassignments at power-up). But the same proviso holds: Software reinstallation will probably be necessary.

The NEC Portable PowerMate is a classic mixed bag. On the bright side, it boasts a very low price, two expansion slots, and an EGA display. At the same time it's heavy, bulky, slow, and limited to 640K of CPU-speed RAM, and the display is seriously flawed by the one-color screen. Still, if you can live with the memory and if low price is your highest priority, this system has undeniable appeal.

EXECUTIVE SUMMARY

NEC PowerMate Portable

80286 transportable

This machine boasts the lowest price in the roundup, plus an EGA display and two AT expansion slots, but it's the largest and heaviest system reviewed, with the worst performance scores and a low 640K limit on CPU-speed RAM.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity		●		
Expandability				●
Portability		●		
Ergonomic design			●	
Performance		●		
Overall value			●	

Ogivar's 286 is fast, light, compact, and reasonably priced and sports an EGA display. Even with its one-shade screen, it makes a tempting package.

Ogivar 286

The Ogivar 286 is a reasonably priced Canadian system with a lot going for it. At $7100, this racer turns in the fastest scores of any 286 in the roundup. It is also the next to lightest 286 machine reviewed. Only its

EXECUTIVE SUMMARY

Ogivar 286

80286 transportable

This light, reasonably priced, easy-to-carry Canadian import took top place in the 286 performance tests, but its keyboard and one-color EGA display are below par.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity		●		
Expandability		●		
Portability				●
Ergonomic design				●
Performance				●
Overall value			●	

problematic display keeps it from being an astonishing value.

The 12.5-MHz clamshell Ogivar weighs in at an easy-to-carry 15 pounds and takes up a middling 14 by 13 by 4 inches (728 in³). Its 12.5-MHz 80286 and 31ms hard drive have a lot to do with its top performance score. The floppy drive is a 720K 3½-inch unit.

The motherboard holds up to 2.6MB of RAM. If you want to reach the 4.6MB maximum for CPU-speed RAM you have to use a 2MB memory board that goes into a proprietary slot. However, since the 2400-bps modem also requires this slot, you must choose between on-board telecommunications capability and large CPU-speed RAM capacity. An optional expansion chassis offers a single XT-compatible slot, but a slow 8-bit I/0 bus is a bad place for memory in an 80286 machine.

The Ogivar's 7-by-7-inch EGA gas plasma display is bright but slightly low in contrast. There are no controls for brightness or contrast, perhaps as a cost-cutting measure. And like the NEC PowerMate's, the Ogivar's screen can show only one color—with all the concomitant hassles. A provided utility permits limited swapping of video attributes, but for best results, install your applications for monochrome.

The 84-key keyboard could be a lot better. It has only 10 function keys and sticks you with an embedded numeric pad. In a bow to Canada's bilingual policy, there's a <Non ASCII> key that toggles 6 alpha keys to produce French punctuation—but unless your word processor and printer are equally bilingual, these keys won't do you much good.

The Ogivar 286 features a ROM-based setup feature, but aside from the color-translation utility you don't get any extra software.

If you need a machine that's light, fast, and inexpensive, the Ogivar 286 could be the system for you. Despite its below-average keyboard and display, it offers an impressive power-to-price ratio.

Toshiba 3200

The midpriced clamshell Toshiba 3200 has been on the market for two years but seems to be holding its own very well, thanks to its excellent EGA gas plasma display, comfortable keyboard, and two expansion slots. And at 20 pounds and 14.5 by 15.25 by 4 inches (885 in³), it's reasonably portable.

With a $7598 price tag (in the *PC World* configuration), the 3200 is not a bargain-basement system. But the price does include 4MB of RAM—1MB socketed on the motherboard and 3MB on a memory board that slides into a proprietary CPU-speed expansion slot. If you want to expand memory above 1MB you must install the full 3MB. With 1MB, the system costs only $5499.

NSTL BENCHMARK TESTING

The exclusive test facility for *PC World*, **National Software Testing Laboratories (NSTL)**, is an independent organization that specializes in evaluating personal computer hardware and software. A recognized pioneer in state-of-the-art test design, **NSTL** believes that the most useful benchmark tests measure how well products perform when executing typical business tasks. **NSTL** testers follow detailed test plans that simulate normal operating conditions. A controlled testing methodology ensures objective, accurate, and consistent results and gives consumers a sound basis for making purchase decisions. **NSTL** publishes its test results in *Software Digest Ratings Report*® and *PC Digest*.™ Neither publication accepts advertising. **NSTL** is located in Philadelphia, Pennsylvania.

Two standard expansion slots (one 8 bit, one 8/16 bit) are built in, but you'll need the 8-bit slot for the modem of your choice. (Toshiba doesn't sell one, but any half-length internal 2400-bps modem will work.) The hard disk has a relatively slow 38ms seek time, and the 3½-inch floppy drive is just a low-density 720K model.

With its fast 12-MHz CPU, the Toshiba 3200's performance scores well toward the top of the 286 pack—even on the processor-intensive *1-2-3* benchmark. The 12-MHz 80286 can be throttled back to 6 MHz via keyboard commands.

The 3200's 7-by-6-inch screen is one of the system's outstanding features. The gas plasma display supports EGA and produces three clearly distinguishable shades of red.

The keyboard is also excellent, thanks to its relatively large size. There are 85 keys, with 10 function keys across the top and a dedicated cursor/numeric keypad.

Toshiba's software bundle proves that good things can come in small packages. Only one application is included, but that's *Metro*, Lotus's powerful desktop manager. You also get the usual diagnostics and setup utilities.

EXECUTIVE SUMMARY

Toshiba 3200

80286 transportable

A winning combination of features includes an excellent EGA display, a top-rated keyboard, two AT expansion slots, and good performance. Considering that the price ($7598 in the *PC World* configuration) includes 4MB of RAM, it's an even sweeter deal.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity			●	
Expandability			●	
Portability			●	
Ergonomic design				●
Performance			●	
Overall value				●

EXECUTIVE SUMMARY

Compaq Portable 386

80386 transportable

With the fastest performance scores in the roundup and a huge 11MB RAM ceiling, this machine has a lot to offer—but its high price, heavy weight, and limited graphics capabilities are serious failings.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity				●
Expandability		●		
Portability		●		
Ergonomic design		●		
Performance				●
Overall value			●	

The two-year-old Toshiba 3200 is no longer a cutting-edge machine, but thanks to its excellent ergonomics, worthy performance, and proven Toshiba reliability, it remains a highly attractive system—and an irresistible deal.

80386 TRANSPORTABLES

Compaq Portable 386

In many respects, Compaq's Portable 386 is virtually identical to its Portable III described in the 286 section—large, heavy, expensive. The two machines have identical hard drives, gas plasma screens, keyboards, software packages, and lunchbox-shaped cases.

On the bright side, the 386 boasts a gigantic CPU-speed RAM capacity, and of course it is a *lot* faster than the III; its 20-MHz CPU gives it the best performance scores in the roundup by a considerable margin. In fact, it runs only a hair slower than a 20-MHz IBM Model 80. Such performance does not come cheap. The Portable 386 has the highest list price in the roundup; in the *PC World* configuration it runs a hefty $9687.

The Portable 386's unusually high RAM capacity makes it an ideal platform for multi-

EXECUTIVE SUMMARY

GridCase 1530

80386 transportable

Like the 1520—its 80286 incarnatian—this 386 system takes tap prize far portability, but it's the slawest af the three 80386 systems tested, and its small 20MB hard disk, awkward keybaard, and limited graphics are additianal reasans nat ta buy.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity			●	
Expandability		●		
Portability				●
Ergonomic design			●	
Performance			●	
Overall value			●	

tasking. Using a proprietary expansion board, you can load it with up to 11MB of 32-bit RAM, all accessed at full CPU speed.

Like its 286 cousin, the Portable 386's bulk and display shortcomings are disappointing. But if you need outstanding performance and memory capacity, and price is no object, look no further.

GridCase 1530

Like the GridCase 1520 (which it closely resembles) described in the 286 section, Grid's 80386-powered 1530 takes top honors in the portability department. The two machines are tied as the lightest, smallest transportables in the roundup. Both also come with a battery that you can swap with a snap-in power supply.

Unfortunately, however, the 1530 seems to be a simple upgrade from the 1520 and shares its rather serious drawbacks. Moreover, it is stuck with a slow 12.5-MHz CPU, which caused it to turn in the worst NSTL scores of any 80386 transportable tested. Nor is it cheap at $8255 (in the standard *PC World* configuration, but with a meager 20MB hard drive).

Like its 286 incarnation, the 1530 has an awkward keyboard and a CGA gas plasma display. The 1520's 4MB RAM capacity is duplicated as well, but in a 386 system this is a serious limitation. As noted in the review of the 1520, you are limited to a 20MB hard drive if you want a floppy as well.

In the final analysis, the verdict on the GridCase 1530 is the same as on the 1520: You can do much better for the price. The Toshiba 5100, an altogether superior 386, is available for $657 less. Unless lightness is your top priority or you simply must have Grid's ROM socket capability, this is a good machine to avoid.

Toshiba 5100

The Toshiba 5100 is a featherweight powerhouse 386, with a fine display and a finer price. It was second-place winner in the NSTL speed trials, as well as the lowest-priced 80386 in the roundup; in fact, it's a bit cheaper than Compaq's Portable III 286. This high-speed system can be yours for only $7598 (in the *PC World* setup), with *Microsoft Windows/386* thrown in. Aside from a minor problem running *PC Paintbrush*, its only drawback is a low RAM ceiling.

EXECUTIVE SUMMARY

Toshiba 5100

80386 transportable

Light, fast, and reasanably priced, this winning system sparts a gaad-laaking EGA gas plasma display. Its law 4MB RAM capacity can be boosted ta 6MB if yau farga an internal madem.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity			●	
Expandability		●		
Portability				●
Ergonomic design			●	
Performance				●
Overall value				●

The 16-MHz 5100 is a 15-pound, 12.25-by-3.6-by-14.25-inch (628-in³) clamshell transportable, which makes it one of the lightest and smallest in the roundup. It includes a 26ms hard disk and a 1.44MB 3½-inch floppy drive.

The motherboard holds 4MB of 32-bit RAM. A proprietary expansion slot lets you add an additional 2MB of CPU-speed RAM or a 2400-bps modem—but not both. This is a bit awkward, since you'll probably want a modem, and 4MB is a low memory limit for an 80386 system. An optional expansion chassis that accommodates five standard 8-bit boards is available.

The 5100 is the only 386 in the roundup that offers EGA; it boasts a 7-by-6-inch gas plasma display. Unfortunately, the display is on the dim side; you'll probably want to crank the brightness and contrast controls all the way up and leave them there.

The keyboard suffers a bit from the machine's compactness; the 82 keys are in a fairly unfamiliar arrangement. The numeric keypad is embedded, but there are dedicated page- and cursor-control keys.

Toshiba's software package is good, including the previously mentioned *Windows/386* and a pop-up utility that lets you remap color assignments on the fly.

Despite its relatively low RAM capacity, the Toshiba 5100's impressive price/performance ratio, portability, and high-resolution EGA display make it the single most outstanding value of this roundup. Run, don't walk.

Top Transportables

There are two Best Buys, and interestingly enough, both are Toshibas.

In the 286 event, the clear winner is the $7598 Toshiba 3200, a machine with two expansion slots, an easy-to-read EGA display, an excellent keyboard, 4MB of RAM, and reasonably good performance at a decent price.

Two other 286 machines placed well but fell short of Best Buy status. NEC's $6070 PowerMate Portable is surprisingly inexpensive and boasts two expansion slots and an EGA display, but it's large, heavy, slow, and limited to 640K of CPU-speed RAM. The $7100 Ogivar 286 is the fastest 286 in the

WHERE TO BUY

Compaq Portable III
Compaq Computer Carp.
20555 FM 149
Haustan, TX 77070
800/231-0900
LIST PRICE: Madel 40 with 640K RAM, 40MB hard drive, 1.2MB 5¼-inch flappy drive, gas plasma display, disk caching software $5799; Madel 20 with 20MB hard drive $4999
ACCESSORIES: unpapulated memary expansian baard $175; 512K memory kit $299, 2MB memary kit $1299; 16-bit memary/modem interface board $70; 1200-bps madem $349, 2400-bps madem $599; 3½-inch 1.44MB flappy disk drive $275; 8-MHz 80287 caprocessar $349; expansian unit $199; 40MB tape backup expansian unit $999; VGA board $599; asynchronaus cammunicatians/parallel printer baard $149; soft carrying case $89; MS-DOS 3.3 and BASIC 3.2 $120, OS/2 1.0 $325; technical reference guide $149
WARRANTY: one-year limited parts and labar
EXTENDED WARRANTY: $45 a month
TECHNICAL SUPPORT: tall-free number, M–F 7 a.m.–9 p.m.
OTHER SUPPORT SERVICES: nane
Reader service no. 610

Compaq Portable 386
Campaq Computer Corp.
LIST PRICE: Model 40 with 1MB RAM, 40MB hard drive, 1.2MB 5¼-inch flappy drive, gas plasma display, disk caching software $7999; Madel 100 with 100MB hard drive $9999
ACCESSORIES: same as for Compaq Portable III except 32-bit memary/madem interface board $70; 1MB–2MB memory expansian board with 1MB RAM $899, 4MB memary expansion board with 4MB RAM $2999, 1MB memary kit $799
WARRANTY: one-year limited parts and labar
EXTENDED WARRANTY: $45 a manth
TECHNICAL SUPPORT: tall-free number, M–F 7 a.m.–9 p.m.
OTHER SUPPORT SERVICES: nane
Reader service no. 611

GridCase 1520
Grid Systems Carp.
47211 Lakeview Blvd.
Fremont, CA 94537-5003
415/656-4700
LIST PRICE: with 1MB RAM, two 3½-inch 1.44MB floppy drives, gas plasma display $4490; with one 20MB hard drive, ane 1.44MB 3½-inch floppy drive $5665; with ane 40MB hard drive, no flappy $6165
ACCESSORIES: 1MB RAM $595, 3MB RAM $2395; 80287 capracessor $495; 2400-bps modem $595; external 720K 3½-inch flappy drive $350, external 360K 5¼-inch flappy drive $395; soft carrying case $60; DOS 3.2 (disk) $150, DOS 3.21 (ROM chip) $200
WARRANTY: 90 days parts and labor
EXTENDED WARRANTY: service cantracts available
TECHNICAL SUPPORT: no tall-free number, M–F 9–5
OTHER SUPPORT SERVICES: none
Reader service no. 612

GridCase 1530
Grid Systems Carp.
LIST PRICE: with 1MB RAM, two 1.44MB 3½-inch flappy drives, gas plasma display $5690; with one 20MB hard drive, one 1.44MB 3½-inch floppy drive $6865; with ane 40MB hard drive, no flappy $7365
ACCESSORIES: same as for GridCase 1520 except 80387 coprocessor $895
WARRANTY: 90 days parts and labor
EXTENDED WARRANTY: service contracts available

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roundup, as well as being quite light and reasonably priced, but its keyboard and display are below par.

In the 386 arena, the big winner is the $7598 Toshiba 5100. Its CPU-speed RAM capacity is limited to 4MB if you want a modem (6MB if you don't), but it's highly portable, has a fine EGA display, and turns in great performance for a reasonable price.

If you really need high-end 386 desktop power to go, the Compaq Portable 386 is a true powerhouse, with top performance scores and a gigantic 11MB RAM capacity. However, it's very expensive ($9687) and bulky, and its 640 by 400 graphics mode display has limited support.

Far too often, compromise is a way of life. But with transportables like our two Best Buys, business users who want the best can now get full-powered computers they can carry—without compromising ease of use or performance. ●

John Diebold is a marine geophysicist specializing in computer analysis of seismic data.

POWER TIP NO. 48

Correct Your WordStar Dictionary

Oops! You just saved a misspelled word to your *WordStar 4.0* or *5.0* personal dictionary. The documentation neglects to mention that *WordStar* creates personal dictionary files in ASCII. You can correct the errant entry by simply editing the contents of the file.

Start *WordStar*, press **N** to open a non-document file, type **Personal.dct**, and press **<Enter>**. Next press **<Ctrl>-QF** to search for the misspelling, or scroll through the dictionary list to find the misspelled word. Make the correction and press **<Ctrl>-KD** to save it.

Rex Farrance
Assistant Editor

TECHNICAL SUPPORT: na tall-free number, M–F 9–5
OTHER SUPPORT SERVICES: none
Reader service no. 613

NEC PowerMate Portable
NEC Hame Electranics (U.S.A.)
1255 Michael Dr.
Waad Dale, IL 60191-1094
800/447-4700, 312/860-9500
LIST PRICE: Model APC-H701 with 640K RAM, 20MB hard drive, 720K 3½-inch flappy drive, backlit LCD display, DOS 3.2 and GW BASIC 3.2 $3995; Model APC-H702 with 40MB hard drive $4695
ACCESSORIES: unpopulated memory expansian board (2MB copacity) $395, 512K memory kit $195; 8-MHz 80287 caprocessor $500; 1200-bps modem $395; 1.2MB 5¼-inch externol floppy drive $495; carrying case $89
WARRANTY: one year parts and labor
EXTENDED WARRANTY: nane
TECHNICAL SUPPORT: through dealer
OTHER SUPPORT SERVICES: none
Reader service no. 614

Ogivar 286
Ogivar Technalagies, Inc.
7200 Raute Transcanadienne
Ville Saint-Laurent, Quebec
H4T 1A3 Canoda
514/737-3340
LIST PRICE: with 640K RAM, 40MB hard drive, 720K 3½-inch floppy drive, EGA gas plasma display, carrying cose, DOS 3.3 $4995; Madel 20 with 20MB hord drive $4595
ACCESSORIES: exponsion baard with 2MB RAM $1625, 10-MHz 80287 capracessor $798, exponsion chassis $336, external 360K 5¼-inch flappy drive $530, 2400-bps madem $480
WARRANTY: one-year depot worranty with Haneywell-Bull
EXTENDED WARRANTY: through Honeywell-Bull
TECHNICAL SUPPORT: M–F 9–5
OTHER SUPPORT SERVICES: none
Reader service no. 615

Toshiba 3200
Toshiba America Inc.
9740 Irvine Blvd.
Irvine, CA 92718
714/583-3000
LIST PRICE: with 1MB RAM, 40MB hard drive, 720K 3½-inch flappy drive, gas plosmo EGA monitor, DOS 3.3, saft carrying case $5499
ACCESSORIES: 3MB RAM module $1699, carrying cose $99
WARRANTY: one-year parts and lobor
EXTENDED WARRANTY: twa-year warranty available
TECHNICAL SUPPORT: toll-free number, M–F 7–5
OTHER SUPPORT SERVICES: CompuServe BBS, in-hause BBS
Reader service no. 616

Toshiba 5100
Tashiba America Inc.
LIST PRICE: with 2MB RAM, 40MB hord drive, 1.44MB 3½-inch floppy drive, gas plasmo EGA disploy, DOS 3.3 $7199
ACCESSORIES: memory boord with 2MB RAM $1299; 1200-bps modem $349, 2400-bps modem $399; exponsion chassis $999; expansian chossis interface card $199; 360K 5¼-inch external flappy drive $499; carrying case $99; 17-key numeric keypad $99; OS/2 1.0 $325
WARRANTY: one yeor parts and labar
EXTENDED WARRANTY: two years
TECHNICAL SUPPORT: toll-free number, M–F 7–5
OTHER SUPPORT SERVICES: CompuServe BBS, in-house BBS
Reader service no. 617

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Five Against IV

dBASE IV has raised the stakes for compatible data managers, but some dBASE III Plus clones still present a better deal.

Alan Schwartz

After Ashton-Tate's introduction of *dBASE III Plus*, three and a half years elapsed without an upgrade, opening a window of opportunity for competitors to jump in. While the giant slumbered, numerous *dBASE* clones popped up, offering more power and features for less money.

dBASE IV finally arrived last fall, and it was a qualified success (see "Is dBASE IV Worth the Wait?" *PCW*, March 1989). The new Control Center interface is a breakthrough, the reporting and screen modules are impressive, and Ashton-Tate introduces query by example and SQL to the dBASE world. A polished application generator and other tools strengthen *dBASE IV*'s position in application development.

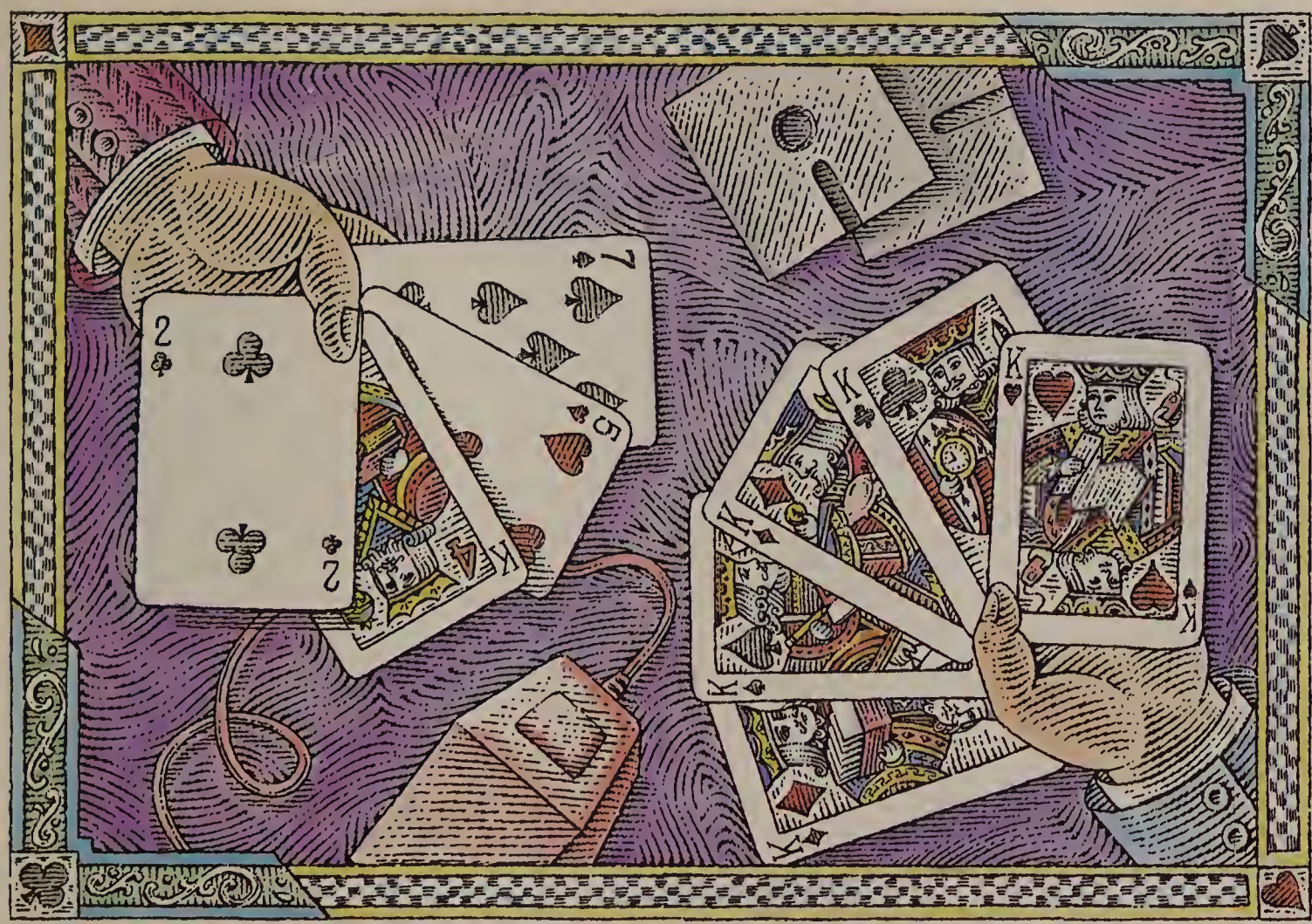
Why consider *dBASE III Plus* clones if *dBASE IV* is so impressive? First, although *dBASE IV*'s performance is much improved, on average it lags behind three of the five programs reviewed here. Second, considering *dBASE IV*'s $795 price, the clones are a bargain. Third, the knockout blow expected from *dBASE IV*'s introduction of SQL queries turned out to be a stage slap.

dBASE IV dominates the features race, but most of the compatibles reviewed here have held their ground quite well. Fox Software's *Foxbase+* is still the speed champ, WordTech's *dBXL* is inexpensive and offers a friendlier interface for novices, and Versa-Soft's low-cost *dBMAN* delivers better relational features. The two compilers reviewed here—Nantucket's *Clipper* and WordTech's *Quicksilver*—can take advantage of the fact that Ashton-Tate's .EXE compiler has yet to appear.

Foxbase Still Faster

With many applications, variations in program speed may mean the difference between blinking once and blinking twice. With data managers, speed often dictates when you break for lunch.

As tests conducted by National Software Testing Laboratories (NSTL) reveal, *Foxbase+* continues to lead the *dBASE* race, running 1.3 to 14 times faster than *dBASE IV*, depending on the task. *dBMAN* and *Clipper* share second place, both running noticeably faster than *dBASE IV*, which dawdles on reporting tasks. WordTech's products fare less well, with *Quicksilver* running more than twice as fast as *dBASE IV* on some tests and twice as slow on others. And *dBXL* lands in last place, trailing *dBASE IV* in every area but reporting.



dBASE compatibility is another key issue, especially if you plan to port applications from *dBASE III Plus*. Only *Foxbase+* and *dBXL* are fully language compatible; *dB-MAN* comes close, but converting a *III Plus* application requires line-by-line recoding. *Clipper* and *Quicksilver*, like all compilers, choke on some macro expressions and full-screen commands such as Edit and Browse. (None of these clones supports *dBASE IV*'s new commands, but *dBASE IV* runs any *III Plus*–compatible program.) All the reviewed clones either use .NDX files or convert them transparently; none supports *dBASE IV*'s .MDX scheme.

One final note when comparing features: The beauty of *dBASE* compatibility is the large assortment of third-party add-ins and turnkey applications you can choose from. Although it's usually best to have all your eggs in one basket—à la *dBASE IV*—it's not a necessity.

Foxbase + 2.1

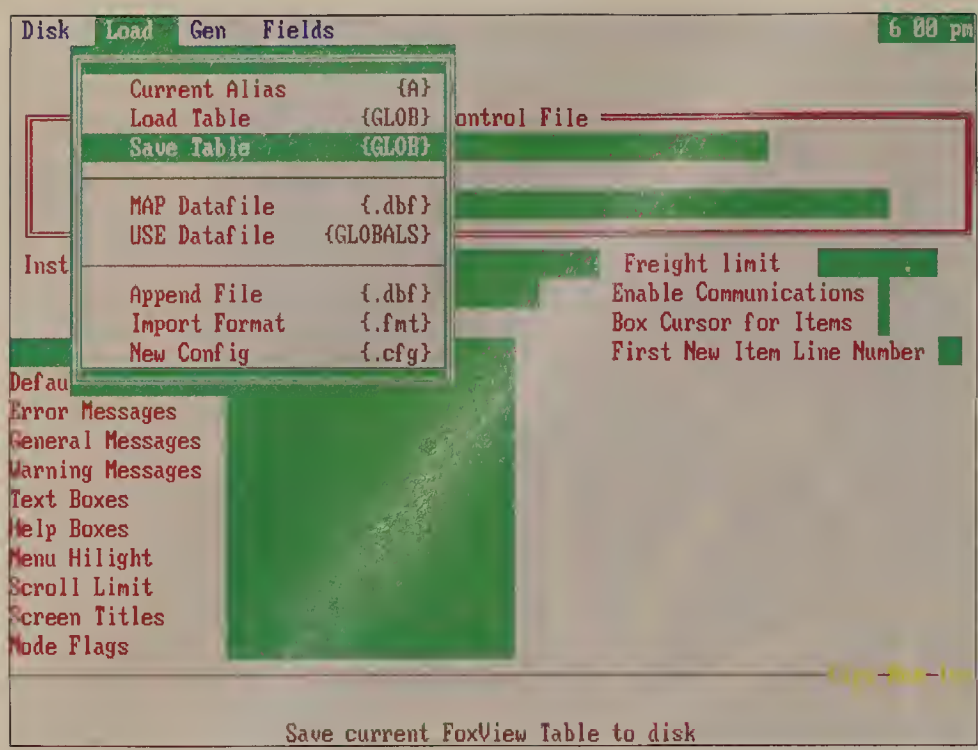
The fastest program in the roundup, *Foxbase+* is so diligently *dBASE* compatible that you can run complex applications without conversion. Add to the mix a reasonable $395 price and an optional unlimited run-time module, and *Foxbase+* is clearly a Best Buy.

Foxbase+ gets its racy performance from a slick precompiler, automatic memory management, and disk caching. It delivers exceptional scores in disk-cranking tasks such as Index, Append, Pack, and Copy.

Foxbase+'s dot prompt and status line are so much like *dBASE*'s that the program prompted an Ashton-Tate lawsuit. Yet version 2.1 greatly enriches its formerly austere interface, offering a menu-driven command builder that's superior to *dBASE III Plus*'s Assistant. Still, it lacks the power of *dBASE IV*'s Control Center, and novices will find its overly technical help facility rather cryptic.

If reporting is crucial, plan on investing in a third-party add-in. *Foxbase+*'s pathetic

CAROLINE VIBBERT



Foxbase + includes a spiffy, object-oriented screen design tool that automatically generates the command file needed to execute it.

report writer hearkens back to *dBASE III*. Columnar layouts are limited, formatting choices are scant, and you get only two levels of subgrouping. Custom reports and data validation require cranking out program code.

Fortunately, *Foxbase+* makes programming a pleasure. You can change and rerun programs instantly and compile them without leaving the dot prompt. This instant feedback almost makes up for the lack of a debugger. As with *dBASE IV*, *Foxbase+*'s agile screen designer automatically generates dBASE code. *Foxbase+* also includes a unique documentation utility (similar to Wallsoft's *Documentor*) that rounds up technical specs for an entire application.

By letting you set multiple relations from a single file, *Foxbase+* can model complex multifile relationships. And thanks to enhanced system capacities—more limited than *dBASE IV*'s, but superior to *dBXL*'s or *dBMAN*'s—you can open enough files to make good use of this feature.

A faster, more powerful *Foxbase* is due this summer, but the current version is already a winner. If swift performance and strict *dBASE* compatibility are paramount, look no further.

EXECUTIVE SUMMARY

Foxbase + 2.1

Data manager

BEST BUY

Foxbase + is the fastest data manager in the roundup, running significantly faster than *dBASE IV*. Its speed, capacity, and superb *dBASE* compatibility make it a Best Buy.

	POOR	FAIR	GOOD	EXCELLENT
Development tools				●
File handling and searching		●		
Reporting		●		
Capacity			●	
Performance				●
Overall value				●

dBXL 1.2c

WordTech's *dBXL* offers high-tech training wheels for dBASE neophytes, good dBASE compatibility, and a low $199 price. Its language extensions deliver spectacular window effects, and it's the only program reviewed that includes business graphics. Unfortunately, memory management is flawed, and it's the slowest program in the roundup except for report selection, where only *dBASE IV* is slower. All told, *dBXL* is recommended only for novices looking for a *dBASE* with a friendly face.

By itself, *dBXL*'s Intro interface is just another clone of *dBASE III Plus*'s Assistant, but coupled with *dBXL*'s superb contextual help system, it's the best interface in the roundup. Intro prompts for every command with pop-up windows, and you can select file and field names from menus and paste them to the command prompt or report writer. Factor in an excellent manual (which includes a tutorial on *dBASE* skills), and you've got a perfect first-timer's package.

The report writer (only slightly better than that of *Foxbase+*) pales in comparison to *dBASE IV*'s. And given the strength of *dBXL*'s windowing commands, the lack of a

dBASE Compatibles Challenge the Champ

dBASE IV bests the competition, but not by much.

● Yes ○ No
◒ Deficient
△ Limited only by available RAM

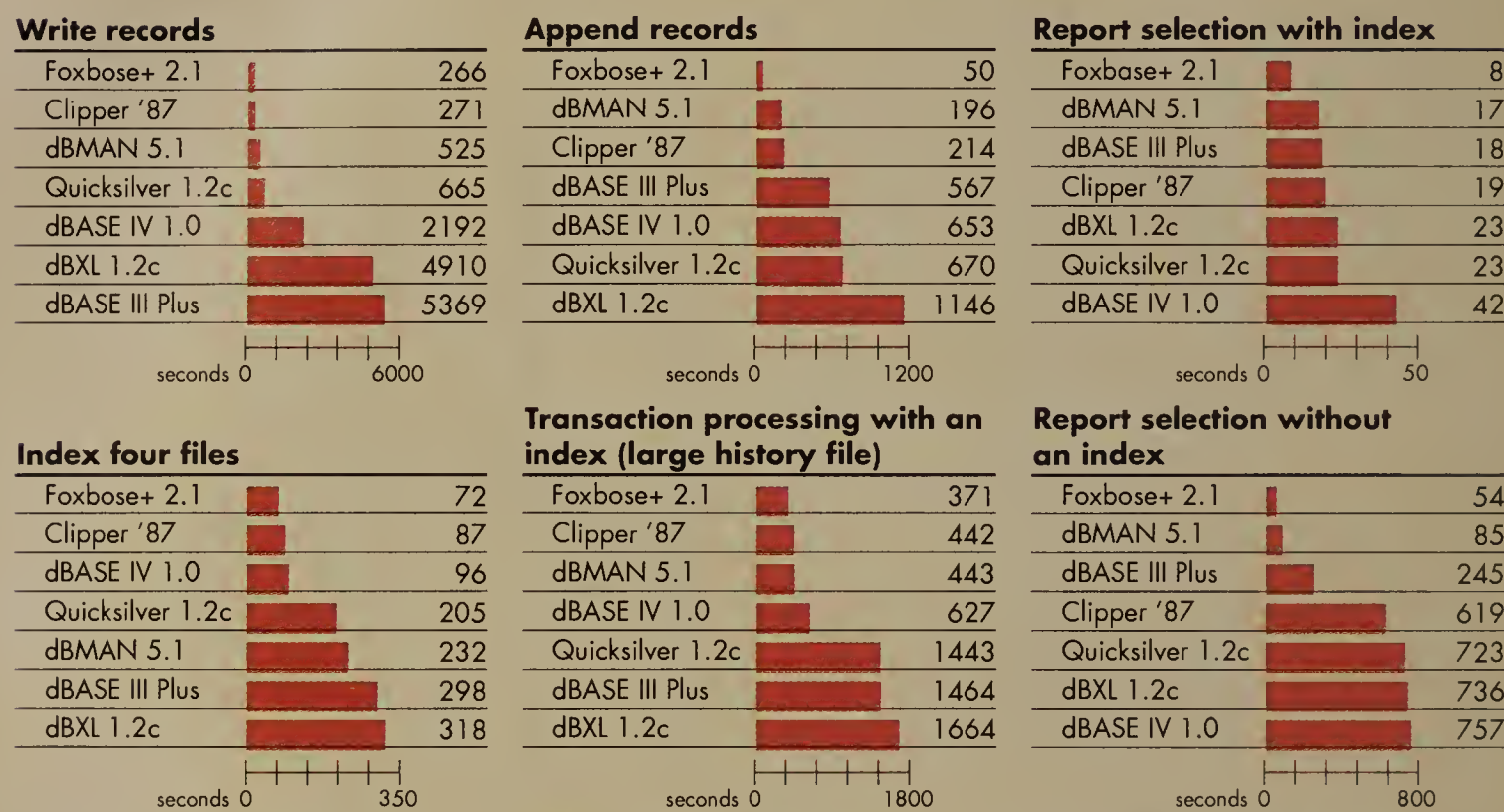
	Foxbase+ 2.1	dBXL 1.2c	dBMAN 5.1	Clipper Summer '87	Quicksilver Compiler 1.2c	dBASE III Plus	dBASE IV
Development tools							
Application generator	●	○	◒	○	○	○	●
Screen painter	●	○	◒	○	○	◒	●
User-defined functions	●	●	○	●	●	○	◒
Compiles source code	●	○	●	●	●	○	●
Produces .EXE files	○	○	○	●	●	○	○
Compatible with dBASE index files	○	●	○	●[1]	●	●	●
Macro implementation	●	●	●[2]	●[2]	●[2]	●	●[3]
Documentation utility	●	○	○	○	○	○	○
Scrollable windowing commands	○	●	●	●	●	○	●
Light-bar menu commands	●	○	●	●	○	○	●
File handling and searching							
Many-to-one relations	●	◒[4]	●	●	◒[4]	◒[4]	●
One-to-many relations	○	○	●	○	○	○	○
SQL queries	○	○	○	○	○	○	◒
Query by example or form	○	○	○	○	○	○	●
Reporting							
Report writer	●	●	●	●	○	●	●
Band-oriented report writer	○	○	●	○	○	○	●
Mailing label generator	●	●	●	●	○	●	●
Capacity							
File size (in billions of records)	1	1	2	1	1	1	1[5]
Fields per record	128	128	128	△	128	128	255
Characters per record	4000	4000	4000	△	4000	4000	4000
Data files/work areas	10	10	10	255	10[6]	10[6]	10
Open indexes per work area	7	7	15–255[7]	15	7	7	470
Open files	48	99	15–255[7]	255[8]	99	15	99
Memory variables	3600	256	△	2048	△	256	15,000
Elements/dimensions per array	3600/2	256/256	0/0	4096/1	△	0/0	1170/2
Memo field support	◒	◒	◒	●	◒	◒	●
Procedures per procedure file	128	32	△	△	128	32	963
Functions per function file	n/a[9]	32	0	△[9]	128	0	n/a[9]
Data encryption	○	○	●	○	○	◒	●
Import/export file conversion[10]							
Fixed	●	●	○	●	●	●	●
.WKS	○	●	○	●	●	●	●
DIF	○	●	●	●	●	●	●
SYLK	○	●	○	○	●	●	●
dBASE II	●[11]	○	○	○	○	○	●

[1] Optionally, by linking supplied object file.
[2] Documented restrictions are imposed.
[3] Not supported in user-defined functions.
[4] Limited to one Set Relation per work area.
[5] Or 2 billion bytes.
[6] Unlikely that 10 fully functional work areas with indexes can be employed, due to other limitations.
[7] Limited by DOS. Version 3.0 or higher from 99 to 255 indexes or files; otherwise up to 15 indexes or files.
[8] Running under DOS 3.3.
[9] Functions stored and counted as procedures.
[10] In addition to listed conversions, dBMAN supports SLF and Memo formats, and dBASE IV supports PFS, RapidFile, and Framework II formats.
[11] Import only.

NSTL TEST REPORT

Foxbase+ Jumps Ahead

The Fox still leads the dBASE performance chase, with dBMAN and the Clipper ship in close pursuit. Quicksilver keeps pace with dBASE IV, but dBXL falls behind.



Methodology
All tests were conducted using o 20-MHz Compoq Deskpro 386 with 5MB of RAM, o 130MB ESDI hord disk, ond o 256K extended memory disk coche. NSTL used o modified version of TP1, o stondord developed out of o reol-world situotion in which o retoil bonk wonted to creote o system with 10 million occounts, 10,000 tellers, ond 1000 bronches. The stondord unit of tronsoction selected wos debit/credit.

Write records
This test creoted the fi!es used in the rest of the benchmork tests; 51,100 records were written to three different files. This benchmork shows how quickly the doto bose con write records to o file.

Index four files
This benchmork meosured the time required to index four files: Account (50,000 records), Teller (1000 records), Bronch (100 records), ond Tronsoct (1000 records).

Append records
After copying 30 percent of the records to three temporory files, the benchmork oppended the temporory files bock onto the Account file (50,000 records). This benchmork not only tests common operotions but serves to jumble the doto bose, moking it more reolistic for the remoining tests.

Transaction processing with an index (large history file)
The Tronsoct file wos exponded from 1000 to 10,000 records, ond then the TP1 benchmork wos run with 1000 tronsoctions. The tronsoct file therefore ended up with 11,000 records.

Report selection with index
This benchmork reported 1000 records from the Account file in index order. Selection criterio were bosed on on index.

Report selection without an index
This benchmork repeoted the previous report-selection test with selection criterio not bosed on on index.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

screen designer is a major flaw. The menu-driven graphing module, however, is a plus. You can easily create pie, bar, line, and scatter graphs from menus, saving them like report forms to re-execute later. Charts are limited to 20 records at once, and you can't adjust scaling; but you can export graphics to *Ventura Publisher*, *PageMaker*, or *PC Paintbrush*, and output options are plentiful.

Packed with features like an overstuffed suitcase, *dBXL* constantly strains at the 640K limit. Open too many windows or run a few TSRs, and you may lose access to the

EXECUTIVE SUMMARY

dBXL 1.2c

Data manager

dBXL is an ecanamicol, full-fledged *dBASE* clane that affers solid compotibility, business graphics, and a friendly user interface. But memary canstroints, slow performonce, and o weak repart writer diminish its allure. *dBXL* is an entry-level product only.

	POOR	FAIR	GOOD	EXCELLENT
Development tools			●	
File handling and searching			●	
Reporting			●	
Capacity			●	
Performance		●		
Overall value			●	

help function—or even crash-land into DOS. Memory variables, arrays, and procedure-file capacities are also limited.

dBXL has merit as an economical entrée to dBASE. Still, speed and memory problems need to be fixed before it can catch *Foxbase+*.

dBMAN 5.1

Although it's the most improved package in the roundup, *dBMAN* still has a way to go. VersaSoft's *dBASE* challenger offers advanced relational and reporting skills and a precompiler that brings performance to respectable *Clipper*-like speeds. Yet compatibility is still gap-toothed and the documentation is confusing. Thanks to a $189.95 price, we recommend it—provided you don't need to convert existing applications.

dBMAN shines in handling complex data relationships. Its powerful Set Relation command is unique in establishing one-to-many relationships, which makes it especially suitable for applications such as invoicing. You can exploit these multirelational skills in reporting. The band-oriented report writer, which splits report components into discrete formatting bands, is the best in the roundup and comparable to *dBASE IV*'s.

dBMAN's manual is poorly organized, and its Assist interface and help system are mediocre. Instead of a floating dot prompt, you get a highly structured command screen—you type commands on the top line while the data displays below.

Speaking to *dBMAN* is a bit like traveling in Scotland—dBASE syntax is generally understood, but you won't forget you're a foreigner. *dBMAN* uses .DBF files and automatically converts .NDX files, but other files require separate conversions. Converting *III Plus* applications is a trial, due to syntax mismatches and proprietary *dBMAN* environment commands. The screen designer is bare bones, and the new text editor is minimal.

dBMAN's advanced relational skills, top-notch reporting, and low price are attractive. But the program won't win many converts until its incompatibilities are remedied.

EXECUTIVE SUMMARY

dBMAN 5.1

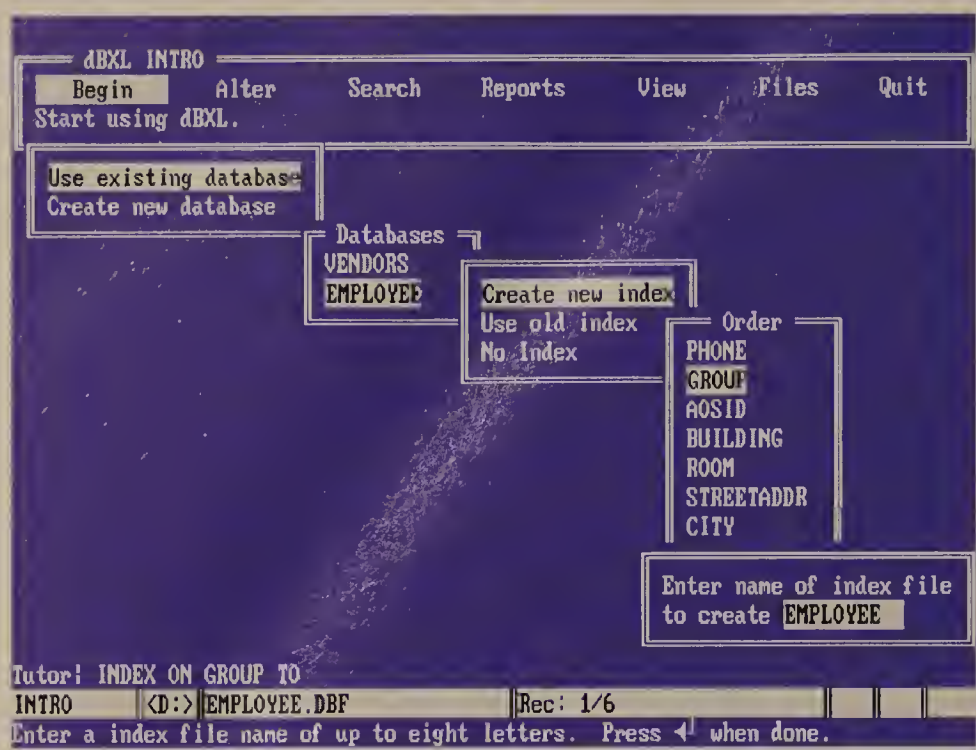
Data manager

The vastly improved *dBMAN* specializes in multi-file relationships and feotures respectable performance and an excellent report writer. Yet *dBASE* incompatibilities moy relegate it to o cult fallawing.

	POOR	FAIR	GOOD	EXCELLENT
Development tools		●		
File handling and searching			●	
Reporting				●
Capacity			●	
Performance			●	
Overall value			●	

Clipper Summer '87

Nantucket's $695 *Clipper* is a speedy compiler cum application development environment that transforms *dBASE III Plus* command files into .EXE programs. In most tests, *Clipper*-compiled files are significantly



Novices will appreciate dBXL's Intro interface. Coupled with a top-notch help system, Intro makes dBASE a little friendlier.

faster than *dBASE IV* files, sharing second place with *dBMAN*. The learning curve is steep, but it's still the best *dBASE* compiler on the market.

Although *Clipper* is easier to use than *Quicksilver*, working with it can still be a struggle. Object files must be linked before they're executed, which slows the writing/testing cycle, and to shoehorn large applications into RAM you have to wrestle with overlays. *Clipper* includes a sophisticated pop-up debugger, but mastering it takes work.

Still, the gain is worth the pain. Using *Clipper*'s concise commands, you can build professional applications sporting context-sensitive pop-up help windows; light-bar menus; fast-scrolling table lookups; and a fully configurable, windowed text editor.

System limitations are blessedly few. You can create massive records and 64K text strings, and under DOS 3.3 open 255 files in unlimited work areas. (*dBASE IV* limits you to 99 files in ten areas.) Support for user-defined functions and memo fields is superior to that of the competition, including *dBASE IV*. Unlike its rivals, *Clipper* lets you link applications with assembler, C, and other object code without restriction.

Clipper is not for novices, and it will challenge casual programmers. But for dBASE professionals, it's the best compiler around.

EXECUTIVE SUMMARY

Clipper Summer '87

dBASE compiler

Clipper is not only a fast *dBASE* compiler but a full programming language in its own right. Advanced commands and programming tools result in professional-quality software, and *Clipper's* open architecture freely links to other languages. Only experts need apply.

	POOR	FAIR	GOOD	EXCELLENT
Development tools				●
File handling and searching			●	
Reporting			●	
Capacity				●
Performance			●	
Overall value			●	

Quicksilver Compiler 1.2c

Quicksilver is another dBASE compiler that spits out .EXE files. Paired with *dBXL*—which uses the same windowing and networking extensions—*Quicksilver* should produce the snazziest applications in the business. Unfortunately, mediocre performance, an awkward compile cycle, and poor memory management keep the $599 *Quicksilver* from fulfilling its promise. Unless you're committed to *dBXL*, pay the extra $96 for *Clipper*.

Due to *Quicksilver*'s memory management flaws, fitting large applications into RAM requires extensive tinkering. Laborious trial-and-error testing is the rule when it comes to determining the maximum number of allowable work areas and memory variables. Compiling is a tedious, confusing affair involving two distinct two-step cycles. After the first cycle, which acts as a precompiler, you can run and debug an application in a run-time module, but performance is exceedingly slow. To optimize and convert the program to an .EXE file, you must endure another time-consuming, two-step cycle. The payoff? Not much. Although *Quicksilver*-

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EXECUTIVE SUMMARY

Quicksilver Compiler 1.2c
dBASE compiler

Quicksilver supports dBXL's extensive windowing commands, but mediocre performance, tedious compiling, and memory limitations hamper its effectiveness.

	POOR	FAIR	GOOD	EXCELLENT
Development tools				●
File handling and searching		●		
Reporting	●			
Capacity		●		
Performance		●		
Overall value	●			

compiled applications can write records three times as fast as *dBASE IV*'s, they're twice as slow on indexing and transaction processing.

As with *Clipper*, there's no user interface—just DOS-level commands with endless options. Documentation is copious but dry, and it lacks advice on avoiding common pitfalls. The optional debugger has no menus, and you can use it only after the first compile cycle. Yet the debugger will fit into as little as 360K of RAM, whereas *Clipper*'s debugger requires more.

Quicksilver's command extensions are enticing. But until WordTech boosts performance, fixes memory problems, and speeds up the compile process, *Clipper* offers smoother sailing.

dBASE Redux

For people who want speedy performance and hassle-free conversions, *Foxbase+* is the answer. Although it lacks some of *dBASE IV*'s features, it's the only *dBASE* clone that offers better overall value. If you're a novice on a budget, check out *dBXL*, and as long as compatibility isn't an issue, you might like the much improved *dBMAN*. If an .EXE compiler is a must, *Clipper* is the best choice.

The *dBASE* story is far from over. Since *dBASE IV* is no longer a moving target, expect quick counterattacks from all the clones to set off yet another cycle of one-upmanship —and more value for users. ●

Alan Schwartz is a data base application specialist living in San Francisco.

WHERE TO BUY

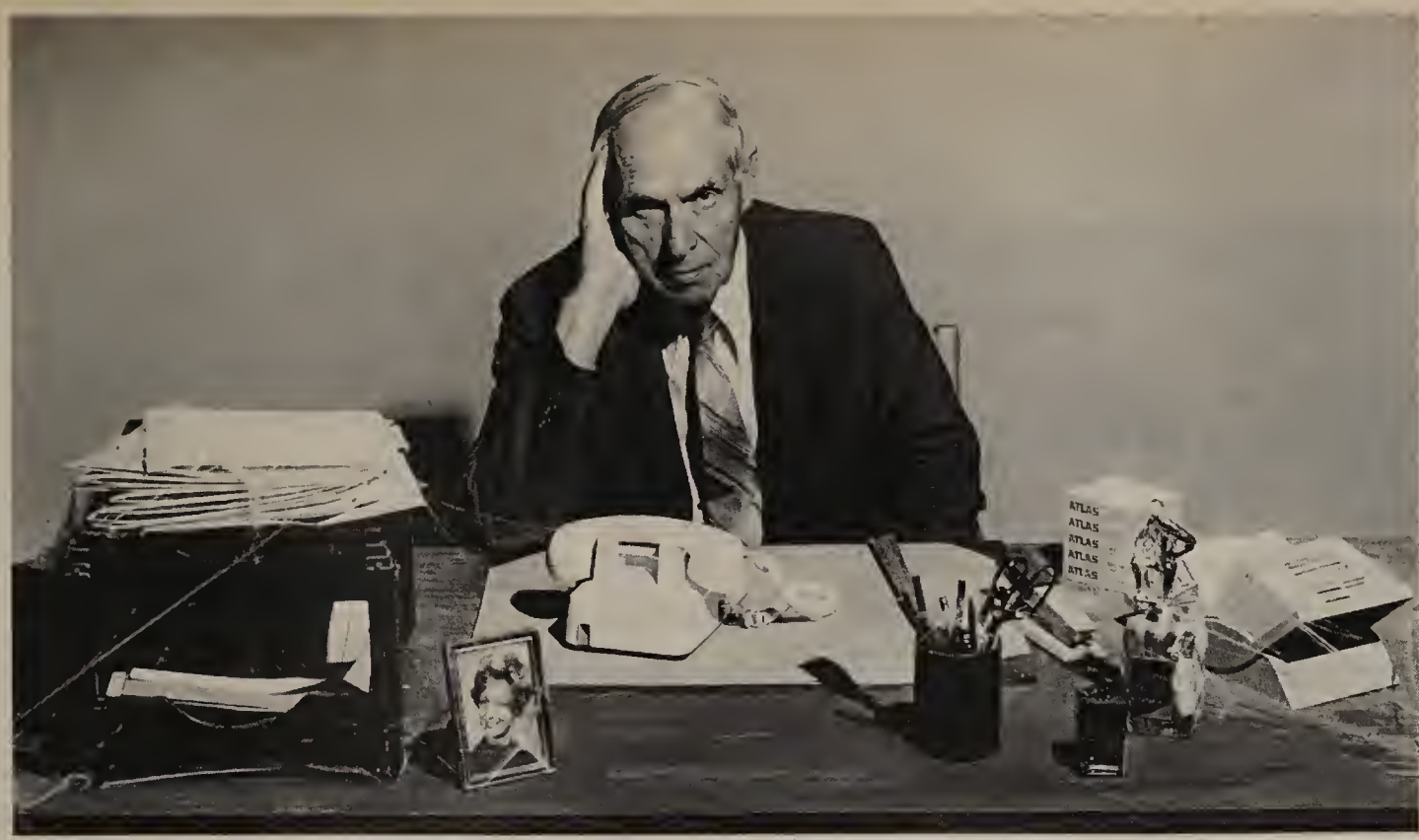
Clipper Summer '87
Nantucket Corp.
12555 W. Jefferson Blvd.
Los Angeles, CA 90066
213/390-7923
LIST PRICE: $695
REQUIREMENTS: 256K, DOS 2.0 or later version (640K and hard disk recommended)
TECHNICAL SUPPORT: 30 days free, then $99 per year or $25 per answered inquiry; no toll-free number, M–F 8–4:30
OTHER SUPPORT SERVICES: newsletter, company BBS
Reader service no. 700

dBMAN 5.1
VersaSoft Corp.
P.O. Box 36078
San Jose, CA 95158
408/723-9044
LIST PRICE: $189.95, LAN version $499 (both include unlimited run-time modules)
REQUIREMENTS: 480K, DOS 2.0 or later version
TECHNICAL SUPPORT: first four months free, then $25 each additional four-month period; no toll-free number, M–F 9–12, 1:30–3
OTHER SUPPORT SERVICES: BBS
Reader service no. 701

dBXL 1.2c
WordTech Systems, Inc.
21 Altarinda Rd.
Orinda, CA 94563
415/254-0900
LIST PRICE: $199, LAN version $599
REQUIREMENTS: 512K, DOS 2.0 or later version (640K and hard disk recommended)
TECHNICAL SUPPORT: first hour free, then $25 per call or $50 for package of 10 calls, $80 for package of 20 calls, $300 per year for unlimited support; no toll-free number, M–F 8:30–5
OTHER SUPPORT SERVICES: newsletter, BBS
Reader service no. 702

Foxbase+ 2.1
Fox Software
118 W. South Boundary
Perrysburg, OH 43551
419/874-0162
LIST PRICE: $395; $595 for multiuser run-time version with licensing fees of $300 for ten copies, $500 for unlimited copies
REQUIREMENTS: 360K, hard disk, DOS 2.0 or later version
TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 9–5
OTHER SUPPORT SERVICES: free monthly newsletter, CompuServe SIG with tech support
Reader service no. 703

Quicksilver Compiler 1.2c
WordTech Systems, Inc.
LIST PRICE: $599
REQUIREMENTS: 360K, hard disk, DOS 3.1 or later version
TECHNICAL SUPPORT: first hour free, then $25 per call or $50 for package of 10 calls, $80 for package of 20 calls, $300 per year for unlimited support; no toll-free number, M–F 8:30–5
OTHER SUPPORT SERVICES: newsletter, company BBS
Reader service no. 704



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FTWARE DIGEST "BusinessWorks is the best of the low cost ounting programs. Most users become productive using Busi-sWorks within just a few days." ★★★★ ***Rating*** August 1988

RSONAL COMPUTING "The excellent interactive guidance . .. le it the clear winner in Practicality." ***No. 1 - Overall Practicality*** uary 1989

OWORLD "Ease of learning is rated excellent. Ease of use is ged excellent." ***Best in its Class*** October 24, 1988

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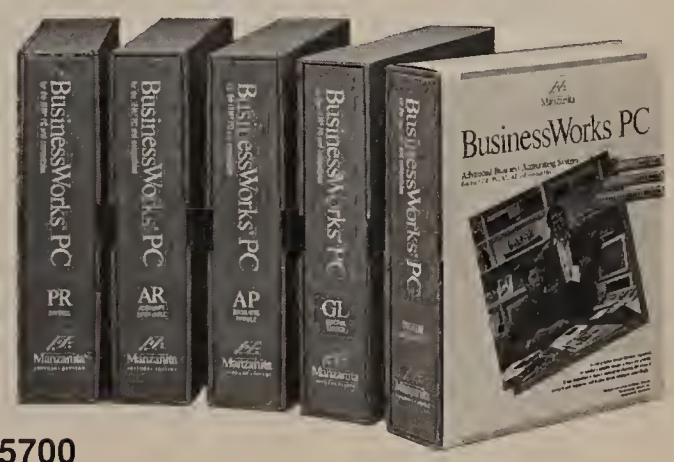

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VGA Boards Raise the Standard

An emerging high-resolution standard promises to keep VGA hardware at the forefront of video graphics.

Six new high-end boards vie for Best Buy.

TJ Byers

Last December *PC World* reviewed ten VGA boards and came up with some clear-cut winners. Since then, a new batch of VGA boards has arrived, sporting 512K of video RAM and 16-bit interfaces for more on-screen colors and improved performance.

Backed by a suite of new performance benchmarks from National Software Testing Laboratories (NSTL), this review examines six 512K, 16-bit boards: the ATI VGA Wonder, the Compaq Video Graphics Controller (VGC), the Hewlett-Packard (HP) VGA, the Sota VGA/16, the Tecmar VGA/AD, and the Video Seven FastWrite VGA. All but one of these boards support one or more extended modes, and all claim 100 percent register-level compatibility with IBM's VGA.

The new VGA speed tests measure performance not only in standard, 640 by 480 VGA mode, but also in resolutions of 800 by 600 and 1024 by 768—the most common super-VGA resolutions. Along with the boards in this roundup, NSTL also tested three 512K, 16-bit boards from the December roundup: the AST VGA Plus, the Video Seven V-RAM VGA, and the Paradise VGA Professional (which had won a Best Buy). Interestingly, the greatest speed differences between these boards show up in word processing—especially in scrolling.

To test claims of VGA compatibility, NSTL subjected each board to its little chamber of software horrors. In 800 by 600 mode, the Video Seven FastWrite quickly cluttered *Ventura 1.1*'s Text Styles menu with garbage characters as files were loaded. The Sota VGA/16 experienced screen flicker and border misalignment with *Ventura* in 1024 by 768 mode. And in 800 by 600 mode, Tecmar's VGA/AD extended-mode screens changed brightness as windows were opened or closed in *Windows 2.03*.

ATI VGA Wonder

PROS: Displays extended-made graphics on VGA and EGA monitors, switchless installatian, mause included

CONS: Expensive (if yau dan't need a mouse)

ATI has loaded everything but the kitchen sink onto the VGA Wonder. This $699 board offers a mouse port, a Logitech mouse, a screen saver, switchless installation, and a TTL port that enables you to drive monochrome, EGA, and CGA monitors. It also has a superior set of extended-mode drivers

and supports all standard graphics modes —plus some extended modes—on nearly every IBM monitor.

In keeping with ATI's one-size-fits-all strategy, the VGA Wonder uses interlacing to display graphics at a resolution higher than VGA, EGA, and monochrome monitors can normally handle. The results are mixed. For example, the 800 by 600 mode flickers badly on an EGA, is close to acceptable on a VGA, and looks surprisingly good on an old-fashioned monochrome monitor.

The VGA Wonder is the only board in the roundup to offer 256-color drivers (although only for *AutoCAD*). It also excels by offering 16-color, 1024 by 768 drivers for *AutoCAD*, *Ventura*, and *GEM*, along with a 4-color one for *Windows*. The overall selection of drivers, though, is a bit less extensive than either Sota's or Tecmar's.

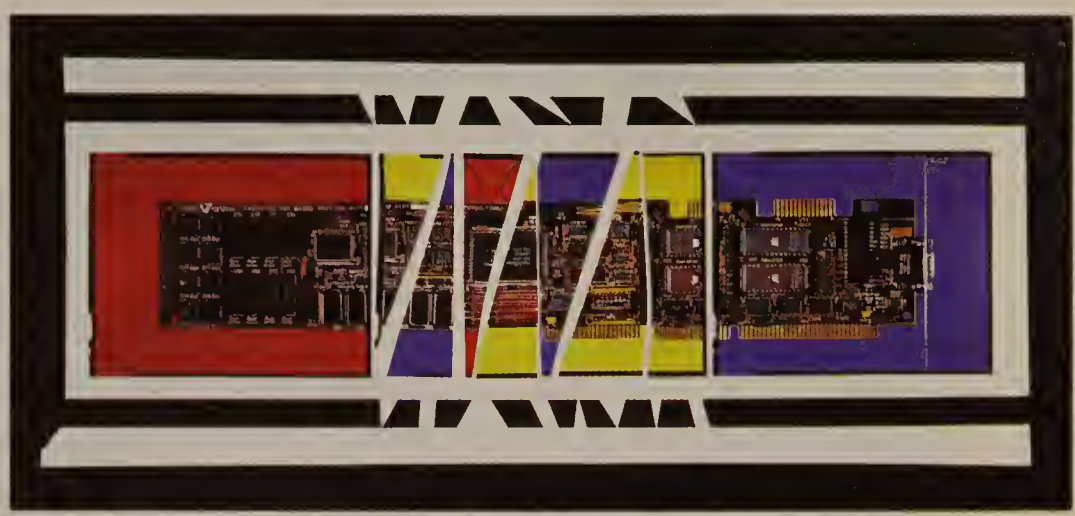
The VGA Wonder's biggest drawback is that its mouse is standard equipment. The Wonder costs $100 more than the Sota VGA/16 for roughly the same features, but it gives you a tad more speed, switchless installation, and some fancy interlacing on a whole range of monitors. Any way you slice it, this board earns a Best Buy.

Compaq Video Graphics Controller

PROS: Good performance, moderate price

CONS: No extended modes or special software emulations of other boards, no TTL output

Despite the Compaq VGC's low $599 price, it's not a good buy. Like any VGA, the VGC runs software written for EGA, CGA, and Hercules graphics boards, using the register-level emulations built into IBM's VGA standard. But unlike most VGAs, including the VGA Wonder, the VGC lacks software-based EGA, CGA, and Hercules emulations, limiting the board's compatibility with some software. The VGC also lacks extended modes and TTL monitor support. All you get for your money is good performance; for a 512K board, that's not enough.



Hewlett-Packard VGA

PROS: Good performance

CONS: Few software drivers, no TTL output

Apart from speed and a small library of custom fonts, the HP VGA has little going for it. Weighing in at a hefty $670, the HP VGA lacks a TTL monitor port and has the second-worst selection of extended-mode drivers in the roundup. It offers special software-based emulation for the CGA and Hercules boards, but not for the EGA.

The catalog of extended-mode drivers is limited to *AutoCAD*, *Cadvance*, and *Windows 1.03*, although Hewlett-Packard claims new drivers are in the works. For now, though, you're paying a steep price for a little more speed and a lot less software.

Sota VGA/16

PROS: Good extended-mode driver support, mouse port, custom fonts

CONS: Fair-to-middling speed

The $595 Sota VGA/16 offers nearly all the features of the ATI VGA Wonder. It includes a generous assortment of extended-mode drivers; software-based emulation of the EGA, CGA, and Hercules graphics boards; plus custom screen fonts, a font editor, and a TTL port. A Microsoft-compatible mouse is a $99 option and comes with a mouse controller chip that plugs into the board.

PIERRE-YVES GOAVEC

The Sota VGA/16 ties with the Tecmar VGA/AD in offering the best selection of extended-mode drivers in the roundup, including an impressive 1024 by 768, 16-color graphics mode for *Windows 2.0*, *GEM*, *Ventura*, and *AutoCAD*. The adapter also offers 800 by 600, 16-color drivers for the same applications.

The Sota VGA/16 is an excellent VGA adapter at a good price. It doesn't perform as many interlacing tricks as the VGA Wonder, and it's a bit slower, but the VGA/16's mouse port, rich driver set, custom fonts, and low price add up to a winner.

Tecmar VGA/AD

PROS: Displays extended-mode graphics on VGA or EGA monitor

CONS: Unimpressive performance

The $695 Tecmar VGA/AD has all the extras: a generous collection of drivers, TTL output, software-based emulations of yesterday's video boards, and the ability to display high-resolution graphics modes on monitors that weren't designed to do so. About all it lacks is a mouse port. Unfortunately, slower performance than the Sota VGA/16's and a price $100 higher keeps this board a hairsbreadth away from being a Best Buy.

Like the ATI VGA Wonder, the VGA/AD supports 800 by 600 and 1024 by 768, 16-color graphics on either a VGA or an EGA monitor. Of course, the interlacing required to perform this trick also creates screen flicker.

When you compare the VGA/AD's driver selection with the Sota VGA/16's, it's pretty much a standoff: The VGA/AD supports more versions of *Windows*, but unlike the Sota VGA/16, it lacks support for *GEM*. Both have 1024 by 768 drivers for *Windows 2.0*, *AutoCAD*, and *Ventura*, but thanks to better-written drivers, the VGA/AD is faster at that resolution.

This feature-laden board is a little pricey, but not without reason. It boasts an excellent set of features and drivers, in addition to its nonmultiscan, extended-mode displays. A bit more speed and a lower price, and the VGA/AD would have equaled the Sota VGA/16.

Video Seven FastWrite VGA

PROS: Fast screen refresh, five-year warranty

CONS: Expensive, hardware incompatibilities

At $758, the Video Seven FastWrite VGA is the most expensive board in this roundup—and far and away the fastest. In addition to raw speed, you get a screen saver, a plethora of extended-mode drivers, and a whopping five-year warranty.

The FastWrite VGA is almost identical to Video Seven's V-RAM VGA board, reviewed in December. However, the FastWrite uses standard DRAM chips and costs $250 less than the V-RAM VGA, and it's almost as fast.

The FastWrite has more extended-mode drivers than any other board in the roundup, and it's the only one with drivers for *Windows/386*. However, the FastWrite's only 1024 by 768 driver is a two-color one for *Ventura*.

High price aside, FastWrite's main difficulty is that it refuses to work with several popular PCs, including the HP Vectra QS/16, the Mitsubishi 386, and the AMT 286—a conflict relating to these systems' use of "shadow RAM" (whereby the system BIOS is copied into main memory). At this writing, Video Seven has just begun offering a free upgrade in the form of a replacement chip to alleviate the problem; all new boards will have the chip already installed. All indications are that this will be a good fix, but play it safe and try before you buy.

Displaying the Future

The blue ribbon for this roundup must be shared by two boards: the ATI VGA Wonder and the Sota VGA/16. Both offer a mouse port, TTL output, and software-based emulations of EGA, CGA, and Hercules graphics boards. Overall, the VGA/16 has a better selection of drivers, plus a solid set of custom screen fonts and a font editor, while the VGA Wonder has a slight edge in speed and offers

FEATURES EVALUATION

Extended-Mode VGA Drivers

The Sota VGA/16 and the Tecmar VGA/AD tie for the best selection of drivers, with the ATI VGA Wonder close behind. The Video Seven FastWrite has the greatest number of drivers but falls short at 1024-by-768-pixel resolution. (The table indicates the number of colors each board's drivers support.)[1]

○ None

1-2-3	ATI VGA Wonder	HP VGA	Sota VGA/16	Tecmar VGA/AD	Video Seven FastWrite
720 x 540	○	○	○	○	16
800 x 600	○	○	○	○	16
Columns and lines					
132 x 25	16	○	16	16	16
132 x 28	○	○	○	16	○
132 x 43	16[2]	○	16[2]	16	16
132 x 60	16	○	○	16	○
100 x 60	○	○	○	○	16
80 x 25	○	○	16	○	○
80 x 60	○	○	16	16	16
Symphony					
720 x 540	○	○	○	○	16
800 x 600	○	○	○	○	16
Columns and lines					
132 x 25	16	○	16	16	16
132 x 28	○	○	16	○	○
132 x 43	16[2]	○	16[2]	16	16
132 x 60	16	○	○	16	○
100 x 60	○	○	○	○	16
80 x 25	○	○	16	○	○
80 x 60	○	○	16	16	16
Windows 2.0					
VGA	○	16[3]	○	16[4]	16
720 x 540	○	○	○	○	16
800 x 440	○	○	○	16[4]	○
800 x 600	16[4]	○	16	16[4]	16
1024 x 768	4	○	16	16[4]	○

Windows/386	ATI VGA Wonder	HP VGA	Sota VGA/16	Tecmar VGA/AD	Video Seven FastWrite
VGA	○	○	○	○	16
640 x 450	○	○	○	○	16
720 x 540	○	○	○	○	16
800 x 600	○	○	○	○	16
GEM					
720 x 540	○	○	○	○	16
800 x 600	16	○	16	○	16
1024 x 768	16	○	16	○	○
Ventura Publisher					
VGA	○	○	○	16	○
720 x 540	○	○	○	○	16
800 x 600	16	○	16	16	16
1024 x 768	16	○	16	16	2
AutoCAD					
VGA	256	16	16	16	16
640 x 350	○	○	○	○	16
720 x 540	○	○	○	○	16
752 x 410	○	○	○	○	16
800 x 600	256	16	16	16	16
1024 x 768	16	○	16	16	○
Cadvance					
VGA	○	16	○	○	○
800 x 600	○	16	○	○	○

[1] The Compaq VGC is not shown becouse it hos no extended-mode drivers.
[2] 44 lines.
[3] Windows 1.03/1.04 only.
[4] Includes drivers for Windows 1.03/1.04.

the roundup's only 256-color driver. Another ATI advantage is extended-mode capability on VGA, EGA, CGA, and monochrome monitors—though the image quality is necessarily spotty.

If you have a mouse, save a hundred bucks and buy the Sota VGA/16. If you need a mouse—or you need to stick with your old monitor for a while and are willing to try your luck with interlacing—then your best bet is the VGA Wonder.

The runner-up is the Tecmar VGA/AD. It offers interlacing tricks similar to the VGA Wonder's and costs the same, but slower performance and the lack of a mouse and a mouse port keep it from matching the VGA Wonder's outstanding value. If you find this board at a good street price, though, you can't go wrong.

Finally, consider the 512K, 16-bit Paradise VGA, one of last December's Best Buys.

NSTL TEST REPORT

Where VGA Speed Matters

Along with the six boards reviewed in this issue, we tested three boards from last December's roundup: the Paradise VGA Professional, the AST VGA Plus, and the Video Seven V-RAM VGA. The benchmarks revealed few significant differences in performance—except in the Microsoft Word scrolling tests, where the two Video Seven boards ran noticeably faster.

Standard VGA resolution

Microsoft Word

Video-7 V-RAM	102
Video-7 FastWrite	109
AST VGA Plus	116
Paradise VGA Pro	116
HP VGA	117
Compaq VGC	123
ATI VGA Wonder	161
Sota VGA/16	170
Tecmar VGA/AD	186

AutoCAD

HP VGA	138
Video-7 FastWrite	138
Video-7 V-RAM	139
Compaq VGC	140
AST VGA Plus	140
Paradise VGA Pro	141
ATI VGA Wonder	142
Sota VGA/16	143
Tecmar VGA/AD	144

WordPerfect

AST VGA Plus	78
Compaq VGC	79
ATI VGA Wonder	82
Sota VGA/16	82
Tecmar VGA/AD	86
Video-7 FastWrite	86
Video-7 V-RAM	86
HP VGA	89
Paradise VGA Pro	89

Microsoft Excel

Compaq VGC	33
HP VGA	33
Paradise VGA Pro	33
Video-7 FastWrite	33
Video-7 V-RAM	33
AST VGA Plus	35
Sota VGA/16	35
Tecmar VGA/AD	36
ATI VGA Wonder	51

800x600 resolution

AutoCAD

Video-7 FastWrite	151
Video-7 V-RAM	152
Tecmar VGA/AD	162
Sota VGA/16	163
ATI VGA Wonder	182
Paradise VGA Pro	206
HP VGA	286
AST VGA Plus	292

Microsoft Excel

Video-7 V-RAM	30
Video-7 FastWrite	33
Paradise VGA Pro	34
Sota VGA/16	35
Tecmar VGA/AD	35
AST VGA Plus	36
ATI VGA Wonder	84

1024x768 resolution

AutoCAD

Video-7 FastWrite	164
Video-7 V-RAM	168
Tecmar VGA/AD	178
Sota VGA/16	183
ATI VGA Wonder	368

seconds 0 300

Microsoft Excel

Video-7 FastWrite	29
Video-7 V-RAM	32
Sota VGA/16	37
Tecmar VGA/AD	37
ATI VGA Wonder	52

seconds 0 150

Methodology
These performance benchmarks were conducted with the VGA boards installed in a 12-MHz Compaq Deskpro 286 Model 20 with a 20MB hard disk and an 8-MHz 80287 coprocessor. A 256K extended memory disk cache was used for the *AutoCAD*, *Microsoft Word*, and *WordPerfect* tests. The *Excel* tests were run under *Microsoft Windows/286* version 2.1 with HIMEM.SYS installed. The Compaq disk cache was not installed for the *Excel* tests, which do not include any disk access. All four tests were conducted in standard, 16-color, 640-by-480-pixel VGA made. The *AutoCAD* and *Excel* tests were also run in 800-by-600-pixel and 1024-by-768-pixel modes, but only on those boards that supplied the appropriate drivers.

Microsoft Word 4.0
In text mode, a *Microsoft Word* auto-execute macro loaded a 2430-line document, scrolled line by line to the end, and exited to DOS. The test was rerun in standard 25-line graphics mode and in 43-line graphics mode.

WordPerfect 5.0
A *WordPerfect* auto-execute macro loaded a 2430-line document, scrolled line by line to the end, and exited to DOS.

AutoCAD Release 10
The *AutoCAD* benchmark consisted of three parts, all of which were written in *AutoCAD's* script language. The first script loaded and displayed a drawing of the space shuttle Columbia, and then displayed three views of the drawing, zooming in on each one. This sequence was repeated 18 times. The second script ran the same sequence with the grid function turned on using 1/10-inch spacing. The third script loaded a sample drawing of a robot, added several wireframe donuts, and displayed five views of the drawing, each at a different magnification. This sequence was repeated four times.

Microsoft Excel 2.1
An auto-execute *Excel* macro loaded a worksheet of 36 rows by 46 columns and set the on-screen font to 8-point Courier. The macro then moved the worksheet one page to the right, one page down, one page left, and one page up. Next, the macro scrolled one cell at a time to the rightmost column of the matrix, to the lower right, to the lower left, and then back to the upper right.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

FORGING A NEW STANDARD

Most graphics boards, whether VGA or EGA, have a couple of special extended-resolution modes for specific programs such as *Windows*, *AutoCAD*, and *1-2-3*. The most popular of these modes comes in at 800 by 600 pixels, a resolution supported by every board in this roundup except the Compaq VGC. The problem is, you must install a special software driver for each software package supported, and there's a good chance your monitor can't handle the higher resolution anyway.

At this writing, NEC and a consortium of graphics companies are creating a new video standard that will overcome these obstacles—the 800-by-600-pixel, 16-color Video Electronic Standards Association (VESA) standard.

Why should you care about this effort? Because most VGA boards already support the VESA standard's resolution, as do most multiscan monitors, such as the NEC MultiSync. If NEC and its cohorts are successful, users who want 800-by-600-pixel resolution will be able to forget about installing drivers and simply select VESA as a display option in most new software packages' installation routines.

Usually a multiscan monitor is required to display 800 by 600 pixels, but two VGA boards—the ATI VGA Wonder and the Tecmar VGA/AD—use *interlacing* to bring this resolution to standard VGA monitors. Interlacing alternates display lines with every other sweep of the electron guns, enabling standard VGA monitors (which normally top out at 480 lines) to simulate 600 lines. An unfortunate by-product is enough flicker to make the scheme unacceptable to many users. —*TJB*

Though it lacks a TTL port and can't match the driver selection of the VGA Wonder or the VGA/16, the $599 Paradise board is close to 50 percent faster than either the ATI or Sota board in the *Microsoft Word* benchmarks.

Though the quality and quantity of drivers vary widely, remember that all the VGA boards in this roundup (with the exception of Compaq's) are ready for tomorrow's VESA standard (see above). If you want a sharper image without spending a bundle—*Windows* users and Presentation Manager fans take note—the VESA standard may be your ace in the hole. ●

TJ Byers is a contributing editor for PC World.

WHERE TO BUY

ATI VGA Wonder
ATI, Inc.
3761 Victaria Park Ave.
Scarboraugh, Ontaria
M1W 3S2 Canada
416/756-0718
LIST PRICE: with 256K $499, with 512K $699
WARRANTY: twa years parts and labar
EXTENDED WARRANTY: nane
TECHNICAL SUPPORT: na tall-free number, M–F 8–5
OTHER SUPPORT SERVICES: suppart graup thraugh Canadian Remate Systems BBS
Reader service no. 601

Compaq Video Graphics Controller
Campaq Camputers Inc.
20555 FM 149
Haustan, TX 77070
713/370-0670
LIST PRICE: with 512K $599
WARRANTY: one year parts and labar
EXTENDED WARRANTY: 12-manth and 36-manth extended warranties available thraugh dealer
TECHNICAL SUPPORT: dealer anly
OTHER SUPPORT SERVICES: dealer anly
Reader service no. 602

HP VGA
Hewlett-Packard
Raseville Terminals Divisian
8020 Faathills Blvd.
Raseville, CA 95678
916/786-8000
LIST PRICE: with 256K $445, with 512K $670
WARRANTY: ane year parts and labar
EXTENDED WARRANTY: nane
TECHNICAL SUPPORT: tall-free number, M–F 8–5
OTHER SUPPORT SERVICES: unlimited phane suppart for aut-af-warranty praducts $45 per manth
Reader service no. 603

Sota VGA/16
Sata Technalagy, Inc.
657 N. Pastaria Ave.
Sunnyvale, CA 94086
408/245-3366
LIST PRICE: with 256K $445, with 512K $595
WARRANTY: twa years parts and labar
EXTENDED WARRANTY: nane
TECHNICAL SUPPORT: tall-free number, M–F 8:30–5:30
OTHER SUPPORT SERVICES: BBS
Reader service no. 604

Tecmar VGA/AD
Tecmar Inc.
6225 Cachran Rd.
Salan, OH 44139
216/349-0600
LIST PRICE: with 512K $695
WARRANTY: twa years parts and labar
EXTENDED WARRANTY: nane
TECHNICAL SUPPORT: na tall-free number, M–F 7–7
OTHER SUPPORT SERVICES: BBS
Reader service no. 605

Video Seven FastWrite VGA
Videa Seven, Inc.
46335 Landing Pkwy.
Fremant, CA 94538
415/656-7000
LIST PRICE: with 256K $599, with 512K $758
WARRANTY: five years parts and labar
EXTENDED WARRANTY: nane
TECHNICAL SUPPORT: tall-free number, M–F 8–5
OTHER SUPPORT SERVICES: BBS
Reader service no. 606

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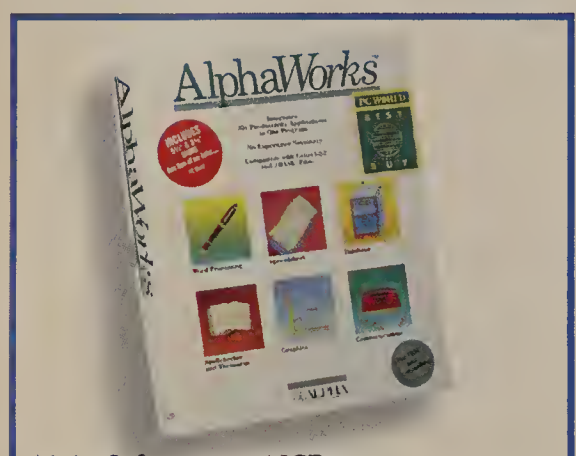
☐Design CAD 3.1 *(NCP)*. . . . . 159.
☐Design CAD 3D 1.1 *(NCP)* . . . . . 159.



Alpha Software ... NCP
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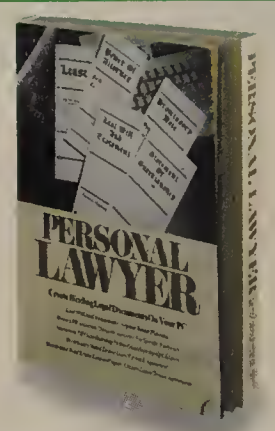
Application Techniques ... NCP
⊡Pizazz Plus 1.2 . . . . . 75.
Ashton-Tate ... NCP
☐dBASE IV 1.0 . . . . . call
⊡MultiMate Advantage II 1.0 . . . . . 299.
Autodesk
☐Autosketch Standard 1.04 . . . . . 55.
Best Programs ... NCP
☐Label Master 3.1 *(mailing label program)* . . 29.
Bible Research ... NCP
☐The Word 4.2 *(King James version)* . . . . . 159.
☐The Word 4.2 *(New International version)* . 159.
Bloc Publishing ... NCP
☐FormTool 2.01 . . . . . 55.
☐Form Filler 2.0 . . . . . 89.
☐Personal Lawyer 2.0 . . . . . 39.
☐PopDrop 3.1 . . . . . 32.
Borland International ... NCP
ⒸSuperkey 1.1 . . . . . 69.
ⒸTurbo C 2.0 . . . . . 99.
ⒸTurbo C Professional Pack *(w/Debugger)* . . . 169.
ⒸTurbo Pascal 5.0 . . . . . 99.



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Broderbund ... CP
☐Print Shop 2.41 . . . . . 39.
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Chipsoft ... NCP
ⒸTurboTax Personal/1040 6.01 . . . . . 45.
Chronos Software ... NCP
⊡Who•What•When *(people, projects, time)* 119.
Computer Associates ... NCP
⊡SuperCalc 5. . . . . 319.
Core International ... NCP
☐Corefast 2.0. . . . . 95.
Crosstalk Communications ... NCP
☐Remote² 1.1 . . . . . 95.
☐Crosstalk XVI 3.7 . . . . . 95.
☐Crosstalk MK.4 1.1 . . . . . 124.
Dac Software ... NCP
☐Dac Easy Payroll 3.0 . . . . . 59.
☐Dac Easy Light 1.0 . . . . . 45.
☐Dac Easy Accounting 3.0 . . . . . 59.
Datastorm ... NCP
☐Procomm Plus 1.1B. . . . . 49.
Delrina Technology ... NCP
⊡Per:FORM 1.0 . . . . . 159.
5th Generation ... NCP
⊡Fastback Plus 2.01. . . . . 109.
Fox Software ... NCP
ⒸFoxbase Plus 2.1 *(single user)* . . . . . 209.
⊡Foxbase Plus 2.1 *(Network version)* . . . . . 319.
Funk Software ... NCP
☐Sideways 3.21 *(creates wide printouts)*. . . . 42.
⊡Worksheet Utlities 1.0 *(1-2-3 utilities)* . . . . . 59.
☐Allways 1.0 . . . . . 85.

General Information ... NCP
ⒸHot Line Two 2.0 . . . . . $49.
Generic Software ... NCP
⊡Generic CADD Level 2 . . . . . 89.
⊡Generic CADD Level 3. . . . . 179.
⊡Estimator . . . . . 159.
ⒸBasic Home Design 3.0. . . . . 35.
ⒸCADD Starter Kit *(Includes Level 2)* . . . . . 109.
Great American Software ... NCP
☐One Write Plus Master 2.01 *(General Ledger)* 129.
☐AP, AR, or Payroll 2.01 . . . . . each 129.
Harvard Associates ... NCP
ⒸPC Logo 3.0 . . . . . 59.
Hayes ... NCP
⊡Smartcom II 3.0. . . . . 89.
⊡Smartcom III 1.0 . . . . . 149.
Hilgraeve Software ... NCP
☐HyperACCESS 3.31 . . . . . 89.
Individual Software ... NCP
⊡Typing Instructor Encore 2.13 . . . . . 26.
☐Professor DOS *(with Smartguide)*. . . . . 27.
Intuit ... NCP
⊡Quicken 2.1. . . . . 35.
Javelin ... NCP
ⒸJavelin Plus 2.02 . . . . . 249.
Lifetree ... NCP
☐Volkswriter 4 . . . . . 159.
Lotus ... NCP
⊡Agenda 1.0 . . . . . 289.
☐1-2-3 2.01 *(upgrade free to version 3.0)* . . . call
☐HAL 1.0. . . . . 109.
☐Symphony 2.0. . . . . 459.
☐Magellan 1.0. . . . . call
☐Freelance Plus 3.0. . . . . 345.
MECA ... NCP
⊡Checkwrite Plus 1.0. . . . . 29.
☐Managing Your Money 5.0 . . . . . 119.
Meridian Technology ... NCP
☐CarbonCopy Plus 5.0 *(2 required)* . . . . . 115.
Micro Logic ... NCP
☐Tornado 1.8. . . . . 55.
Microlytics ... NCP
☐WordFinder 4.0 . . . . . 35.
☐GOfer 1.0 *(text retrieval system)* . . . . . 45.

Harvard Associates ... NCP
Ⓡ*PC Logo 3.0*—PC Logo is the perfect companion for the Logo your children are learning in school. Encourage your child's creativity and critical thinking skills while sharing in the discovery of ideas at home . . . . . $59.

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Generic Software ... NCP
☐ *CADD Level 3* is a sophisticated drafting package. The Generic Starter Kit includes CADD Level 2, Basic Home Design, as well as a workbook tutorial.
Generic CADD Level 3 ..... $179.
Generic CADD Starter Kit ..... 109.

MicroPro ... NCP
☐WordStar Professional Release 5 ..... 209.
☐*Upgrade to Release 5 from any version* ... 89.
Microrim ... NCP
⊡R:BASE for DOS *(version 2.1)* ..... 489.
⊡R:BASE Compiler ..... 629.
Microsoft ... NCP
☐Learning DOS 2.0 *(for any DOS version)* .. 35.
☐Windows 286 2.1 ..... 69.
☐Works 1.05 ..... 99.
⊡Windows 386 2.1 ..... 129.
⊡Word 5.0 ..... call
⊡Excel 2.1 *(requires 80286/80386 CPU)* .. 239.
LANGUAGES
☐Quick BASIC 4.5 ..... 69.
☐Quick C 2.0 ..... 69.
⊡Macro Assembler 5.1 ..... 99.
⊡Basic Compiler 6.0 ..... 199.
⊡C Compiler 5.1 ..... 299.
Monogram ... NCP
⊡Dollars and Sense 3.1 ..... 105.
Multisoft ... NCP
☐Super PC Kwik 3.2 *(disk cache utility)* .... 49.
☐Super PC Kwik Power Pak 1.1 ..... 59.
Nantucket Software ... NCP
⊡Clipper *(Summer '87, dB3 Plus compiler)* 429.
New England Software ... NCP
⊡Graph-in-the-Box Release 2 ..... 75.
☐GB-Stat 1.0 ..... 159.
⊡GB Analytic 1.0 ..... 105.
Nolo Press ... NCP
☐WillMaker 3.0 ..... 35.
☐For The Record 1.0 ..... 35.
North Edge Software ... NCP
☐Timeslips III 3.3 ..... 169.
Owl International ... NCP
☐Guide 2.0 ..... 143.
Paperback Software ... NCP
☐VP-Info 1.4 ..... 65.
☐VP-Planner Plus 2.0 ..... 145.
☐VP-Expert 2.02 ..... 145.
Paul Mace ... NCP
☐Nvelope 1.02 ..... 29.
☐HTest—HFormat 2.0 ..... 49.
☐Mace Utilities 5.0 *(DOS utilities)* ..... $55.
☐Mace Gold 1.0 ..... 79.
PC Support Group ... NCP
☐Lightning 4.82 ..... 39.
☐Lucid 3-D 2.0 ..... 75.
Personics ... NCP
☐SmartNotes 2.0 ..... 49.
☐SeeMORE 1.02 ..... 49.
☐Look&Link 1.01 ..... 59.
☐Ultravision 1.1 ..... 79.
Peter Norton ... NCP
⊡Norton Editor 1.3 ..... 39.
⊡Norton Commander 2.01 ..... 45.
⊡Standard Utilities 4.5 ..... 55.
⊡Advanced Utilities 4.5 ..... 79.
⊡Dan Bricklin's Demo Program 2 ..... 99.
Quarterdeck ... NCP
☐Expanded Memory Manager 4.2 ..... 39.
☐DESQView 2.2 ..... 79.
☐DESQView 386 1.0 ..... 115.
Reference Software ... NCP
☐Grammatik III 1.07 *(electronic proofreader)* 52.
☐Reference File 1.0 *(pop-up DB manager)* .. 49.
Relay Communications
☐Relay Gold 3.0 ..... 149.
Revolution Software ... NCP
⊡VGA Dimmer 2.01 *(screen saver)* ..... 19.
⊡Cruise Control 3.02 ..... 39.
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☐Rightwriter 3.0 ..... 54.
Simon & Schuster ... NCP
☐Typing Tutor IV ..... 33.
Softlogic Solutions ... NCP
☐Software Carousel 3.0 ..... 49.
☐Disk Optimizer 4.01 *(w/Data Guardian)* ... 45.
⊡FATCAT 1.0 ..... call

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⊡PFS:First Graphics 1.0 ..... 95.
⊡PFS:First Choice 3.01 ..... 99.
⊡Professional Write 2.1 ..... 145.
⊡Professional File 2.0 ..... 189.
⊡Office Writer 6.1 ..... 299.
⊡Harvard Graphics 2.12 ..... 299.
⊡Harvard Graphics Accessories Pack .... 299.
⊡Harvard Project Manager 3.0 ..... 439.
Spinnaker ... NCP
☐Resume Kit 1.0 ..... 25.
☐8-in-1 ..... 39.
⊡Splash 1.0 ..... 59.
Springboard ... NCP
☐Newsroom Pro 1.0 ..... 45.
Symantec ... NCP
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⊡Q & A Write 1.01 ..... 135.
⊡Grandview 1.0 ..... 195.
☐Q & A 3.0 *(database, word processor)* ... 235.

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⊡Spreadsheet Analyst 2.5 ..... 99.
⊡Think Tank 2.41NP ..... 135.
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⊡Scrapbook+ 1.0 ..... 79.
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⊡EPS (PostScript) Illustrations ..... 79.
The XTREE Co. ... NCP
⊡XTREE Pro 1.1 ..... 69.
TOPS ... NCP
Flashcard (AppleTalk network card; 1 year warranty) ..... 169.
NetPrint 2.0 *(share printers)* ..... 119.
TOPS 2.0 ..... 119.
TOPS Repeater *(extends network)* ..... 132.
Traveling Software ... NCP
Battery Watch 1.0 *(3½" only)* ..... 27.
⊡LapLink Mac 2.0 *(Mac-PC transfer)* ..... 79.
⊡LapLink Plus 2.1 ..... 85.
⊡ViewLink 1.0 *(first product to link all your existing software programs and data)* .... 95.
⊡DeskLink 2.21 ..... 99.

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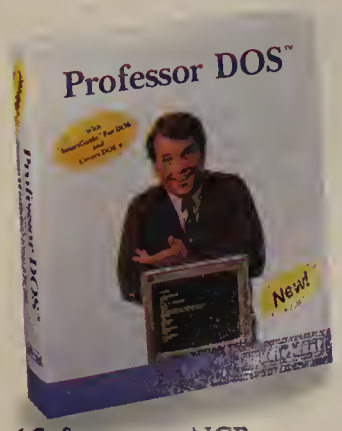

Individual Software ... NCP
☐*Professor DOS*–Professor DOS offers the most comprehensive, up-to-date information and has trained over 1 million people on everything you need to know to use your PC's disk operating system efficiently. . . . . $27.

True BASIC, Inc. ... NCP
☐True BASIC 2.1 *(now includes Runtime)* . . . 57.
⊞3-D Graphics . . . . . 45.

Vericomp ... NCP
⊙SoftBytes 2.0 . . . . . 35.

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⊙WordPerfect Library 2.0 . . . . . 69.
⊙WordPerfect Executive . . . . . 129.
☐WordPerfect 5.0 . . . . . 239.
⊙WordPerfect Office 2.0 . . . . . 269.
⊞WordPerfect Network 5.0 . . . . . 349.
⊞Additonal Network Stations 5.0 . . . . . 84.

Wordtech ... NCP
☐DBXL 1.2 . . . . . 119.

Xerox ... NCP
☐Ventura Publisher 2.0 . . . . . call

XYQUEST ... NCP
☐XyWrite III Plus 3.54 w/A-la-Carte Menus . 229.

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Accolade ... CP *(reqs. graphics brd.)*
⊞Hardball *(baseball simulation)* . . . . . 11.
⊞Testdrive *(driving simulation)* . . . . . 22.
⊞Jack Nicklaus' 18 Greatest Holes . . . . . 29.
⊞Grand Prix . . . . . 22.

Barron's ... CP
⊞SAT *(Test preparation program)* . . . . . 35.

Broderbund ... CP
⊞Where in the World is Carmen Sandiego? . 25.
⊞Where in the USA is Carmen Sandiego? . . 25.
⊞Where in Europe is Carmen Sandiego? . . . 29.
☐JetFighter *(by Velocity)* . . . . . 35.

Electronic Arts ... CP *(reqs. graphics brd.)*
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⊙Life and Death *(from Software Toolworks)* . . 35.
⊙Chuck Yeager's Flight Trainer 2 . . . . . 35.
☐688 Attack Sub . . . . . 35.
☐Magic Candle . . . . . 35.

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☐F-15 Strike Eagle *(requires CGA)* . . . . . 22.

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☐Gauntlet . . . . . $29.
⊞Paperboy . . . . . 29.
☐Colony 1.0 . . . . . 30.
⊞Balance of Power 1990 . . . . . 30.

Parlor Software ... CP
☐Bridge Parlor 2.3 . . . . . 49.

Sierra On-Line ... CP
(All require Hercules, CGA or EGA)
⊙Leisure Suit Larry II . . . . . 33.
⊙King's Quest IV *(512k version)* . . . . . 33.
⊙Manhunter . . . . . 33.
⊙Police Quest II . . . . . 33.
⊙Space Quest II . . . . . 33.
⊙Gold Rush . . . . . 25.

Spectrum Holobyte ... NCP
⊙Tetris *(addicting mind teaser)* . . . . . 24.
⊙Falcon/AT *(F-16 simulation, reqs. graph. brd.)* 32.

Stone & Assoc. ... NCP *(reqs. graph. brd.)*
⊞Memory Master *(ages 2 to 6)* . . . . . 22.
⊙My Letters, Numbers, Words *(2 to 6)* . . . . . 22.
☐2nd Math *(ages 7 to 16)* . . . . . 27.

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Magic Candle from Miles Computing . . . . . $35.
688 Attack Sub from Electronic Arts . . . . . 35.

Sublogic ... NCP
☐Jet 2.1 *(requires EGA or CGA)* . . . . . 33.
☐Up Periscope . . . . . 25.

True BASIC, Inc. ... NCP
⊞Kemeny/Kurtz Math Series . . . . . 32.

XOR ... NCP
☐NFL Challenge 2.0 . . . . . 69.

HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.

AST Research ... 2 years
I/O Mini 2 C/S/P . . . . . 89.
SixPakPlus 64k C/S/P *(upgrades to 576k)* 129.
Advantage Premium 512k S/P . . . . . 429.
RAMpage Plus 286 512k *(for XT286/AT)* . . 539.
RAMpage Plus MicroChannel 512k . . . . . 539.

Compucable ... 2 years
2-Position switch box . . . . . $29.
3-Position switch box . . . . . 39.

Cuesta ... 1 year
Datasaver 400 Watt
(standby power backup) . . . . . 459.

Curtis ... lifetime
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Disk Holder DB-1 *(holds 50 5¼" disks)* . . . . 8.
3½" Disk Holder DB-2 *(holds up 40 disks)* . 8.
Printer Stand PS-1 . . . . . 18.
Universal System Stand SS-3 . . . . . 25.
Smartmodem-to-PC Cable EC-7 *(9 feet)* . . . 17.
Printer-to-IBM cable EC-6 *(9 feet)* . . . . . 17.
Filtered SafeStrip SPF-3 . . . . . 21.
Emerald SP-2 . . . . . 36.
Ruby SPF-2
(6 outlets; EMI/RFI filtered; 6 ft cord) . . . . . 55.
Ruby-Plus SPF-2 Plus
(w/FAX & modem protection) . . . . . 69.

DCA ... 1 year
Irma 2 *(3270 emulation board)* . . . . . 729.
Irma 2 Micro Channel . . . . . 729.

Epson ... 1 year
We are an authorized Epson Service Center.
FX-850 *(80 col., 264 cps, 9 pin)* . . . . . call
FX-1050 *(136 col., 264 cps, 9 pin)* . . . . . call
LQ-500 *(80 col., 180 cps, 24 pin)* . . . . . 295.
LQ-850 printer *(80 col., 264 cps, 24 pin)* . . call
LQ-950 printer *(110 col., 264 cps, 24 pin)* . call
LQ-1050 printer *(136 col., 400 cps, 24 pin)* call
LQ-2550 printer *(136 col., 400 cps, 24 pin)* call
LX-800 printer *(80 col., 180 cps, 9 pin)* . . . 179.
Printer-to-IBM cable *(6 feet)* . . . . . 15.
RIBBONS
For FX-850, LX-800, LQ-850, LQ-500 . each 7.
For the LQ-950 . . . . . 10.
For FX-1050, LQ-1050, LQ-2550 . . . . each 12.

Everex ... 1 year
1200 Baud Internal Modem . . . . . 79.
2400 Baud Internal Modem . . . . . 149.

5th Generation ... 1 year
Logical Connection 512k . . . . . 529.
Logical Connection 1 Meg . . . . . 749.

Spectrum Holobyte ... NCP
⊙*Falcon/AT*–Experience the 3-D graphic images as you fly at the speed of sound in your F-16 Falcon Jet. Go head to head in a dogfight with Mig 29's or Mig 21's, complete with heads-up displays. (Req. 80286 or 80386 CPU). . . . $32.

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Smartmodem 1200 ..... 289.
Smartmodem 1200B *(with Smartcom II)*.. 289.
Smartmodem 1200B *(hardware only)*.... 259.
Smartmodem 2400 ..... 429.
Smartmodem 2400B *(with Smartcom II)* . 429.
Smartmodem 2400B *(hardware only)* ... 399.
Hercules ... 2 years
Graphics Card Plus ..... 189.
Intel ... 5 years
2400B Modem *(internal modem)*..... 239.
2400B Modem 2 *(internal modem for PS/2 Models 50/60/80)* ..... 269.
Inboard 386/PC w/1 Meg ..... 599.
Inboard 386/PC Piggyback 4 Meg..... 1249.
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Inboard Installation Kit *(specify computer)* 139.

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Above Board Plus I/O 512k ..... 469.
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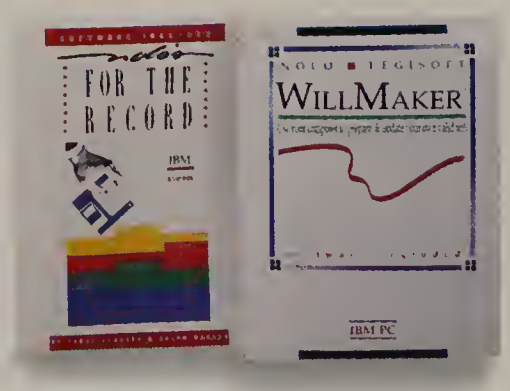
80287-8 *(for 8 MHz 80286 machines)*.... 219.
80287-10 *(for PS/2 Models 50 & 60)*..... 259.
80387SX *(for 80386SX machines)*..... 359.
80387 *(for 16 MHz PS/2 Model 80)*..... 399.
80387-20 *(for 20 MHz PS/2 Model 80)*... 459.
Kensington Microware ... 1 year
Masterpiece ..... 94.
Masterpiece Plus..... 109.
PowerTree 10 *(surge protection)*..... 19.
PowerTree 20 *(surge protection and filter)*.. 29.
PowerTree 50 *(surge/filter/modem prot.)*... 52.



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☐ *WillMaker/For the Record*–Keep track of your legal and personal records with For the Record. Along with WillMaker you'll have the perfect tools to manage your estate and plan for the future.
WillMaker 3.0/For the Record 1.0.....each $35.

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Kraft ... 5 years
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High Speed Joystick Adapter Card ..... 25.
KYE International ... lifetime
Dyna Mouse GM6+ *(w/Dr. Halo III)* ..... 54.
Logitech ... lifetime
Series 2 Mouse *(for PS/2 50/60/70/80)*.... 65.
New HiREZ Mouse *(bus or serial)*..... 89.
Mouse w/Paint Show *(bus or serial)* ..... 95.
ClearCase Mouse *(serial only)* ..... 99.
ScanMan *(hand held scanner)*..... 219.
Magnavox ... 2 years
13" CGA Monitor *(8CM515)*..... 269.
14" Hi-Res Monitor *(9CMO53)*..... 369.
14" VGA Monitor *(9CMO62)* ..... 389.
14" VGA Monitor *(9CMO82)* ..... 449.
Microsoft ... 2 years
Mach 20 *(1 yr. wrty.)*..... 349.
Mach 20 Disk Plus Option *(floppy controller)* ..... 69.
Mach 20 Memory Plus Option *(512k upgradeable to 3.5 Meg)*..... 339.
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Mouse with Easy CAD *(bus or serial)* .... 125.
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OmniMouse *(serial only; 1 year warranty)*.. 49.
PC Mouse II w/PC Paint+ *(bus or serial)*... 89.
PC Mouse II w/Autosketch *(bus or serial)* . 105.
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Multisync 2A *(VGA Monitor)*..... 499.
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Turbo Cool 250 *(run 25° - 30° cooler)* ... 169.
Silencer 150 *(84% noise reduction)* ..... 115.
Silencer 200 *(69% noise reduction)* ..... 149.
Turbo Cool 375 ..... 299.
PC Support Group ... 1 year
Breakthrough 286-12 *(12MHz accelerator board)*..... 449.
Breakthrough 286-8 *(8MHz accelerator board)*..... 299.
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1200 Baud External Modem *(mini)*..... 79.
P/Link *(extends par. print signal)*..... 109.
Microbuffer Inline *(par. print buffer/32k)* 135.
2400 Baud Internal Modem ..... 159.
2400 Baud External Modem ..... 179.
2400 Baud Internal Modem for PS/2 .... 229.
Princeton Graphics ... 1 year
Max15 Monochrome Monitor ..... 269.
HX-12E *(12" EGA Monitor)*..... 499.
Ultrasync *(supports CGA, EGA, VGA)* ... 549.
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Safe 425W *(standby power backup)*..... 369.
Safe 500W *(standby power backup)*..... 495.
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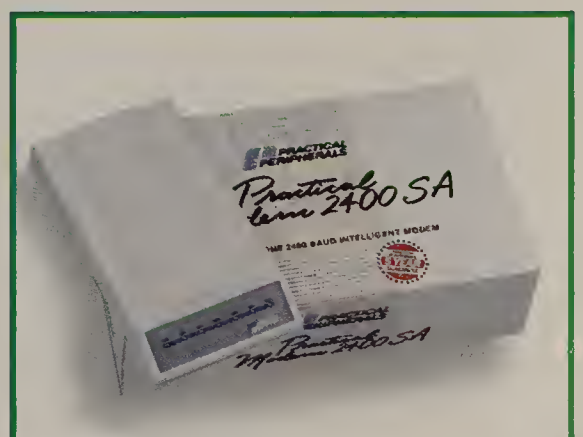
Leather Laptop carrying case ..... 129.
TheComplete PC ... 2 years
TheComplete Hand Scanner 400..... 169.
TheComplete Hand Scanner 200 *(half-pg)* 169.
TheComplete Answering Machine..... 239.
TheComplete FAX 4800 ..... 279.
TheComplete FAX 9600 ..... 449.
Toshiba ... 1 year
T1000 Laptop *(80C88, 6.4 lbs., 5 hr. battery)*.. call
T1600 Laptop *(80C286, 12MHz, 20 Meg)* 3349.
T3100E Laptop *(80286, 12MHz, 20 Meg)* call



Practical Peripherals ... 5 years
2400 Baud External–The 2400SA is a 100% Hayes compatible, 0-300/1200/2400 baud modem. With made in the USA quality, it features "automatic adaptive equalization" for more reliable transmissions..... $179.

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VEGA VGA *(supports full VGA specs)*. . . . 287.
FastWrite VGA *(800x600 max. resolution)* 379.
VRAM VGA *(1024x768 max. resolution)*. . 529.

DRIVES

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Tape System/2 *(for PS/2 MicroChannel)* . . 299.
Retriever/40 *(for IBM AT & compatibles)* . . 349.
IOMEGA ... 1 year
Bernoulli II Single 20 Meg Internal *(5¼")* . 767.
Bernoulli II Single 44 Meg Internal *(5¼")* . 995.
Bernoulli II Dual 20 Meg External *(5¼")*. 1659.
20 Meg Cartridge Tripak *(5¼")* . . . . . 169.
44 Meg Cartridge Tripak *(5¼")* . . . . . 259.
PC2 Card . . . . . 169.
PC2B Card *(bootable card for PC/XT/AT)* . 229.
PC4 Card *(for PS/2 Model 50/60/70/80)*. . 299.
Mountain Computer ... 1 year
40 Meg Internal Tape Drive *(XT, AT or PS/2)* 379.
40 Meg External Tape Drive *(XT, AT or PS/2)* . 479.
40 Meg External Tape Drive w/Power Supply *(XT, AT, or PS/2)* . . . . . 569.
40 Meg Data Cartridges *(pre-formatted)* . . 35.
Plus Development ... 2 years
Hardcard 20 Meg *(49 ms)* . . . . . 549.
Hardcard 40 Meg *(28 ms)* . . . . . 699.
Seagate ... 1 year
FREE PCTV® Hard Drive Installation Tape with purchase of 20, 30 or 40 Meg Seagate drive for the IBM PC (not for AT). Beta or VHS.
20 Meg Internal Hard Drive ST225 *(w/controller and cables, 65 ms)* . . . . . 299.
30 Meg Internal Hard Drive ST238 *(w/controller and cables, 65 ms)* . . . . . 329.
40 Meg Internal HD ST251 for AT *(40 ms)* . 399.
40 Meg Internal HD ST251 for XT *(w/controller and cables, 40 ms)* . . . . . 449.
40 Meg Internal HD ST251-1 for AT *(28 ms)* . . . . . 449.
80 Meg Internal HD ST4096 for AT *(28 ms)* . . . . . 669.

Safe Power System ... 2 years
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Maxell *(10 disks per box)* . . . . . 20.
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INSIDE THE HARDWARE SHELF

120 **Compaq SLT/286**
A trim laptop built for speed and endurance, the SLT offers a winning combination of performance, portability, and display. Only the price may give you pause.

122 **Acer LP-76**
Fast text printing and long-term wear aren't this LaserJet clone's strong suits. But if pictures and pocketbook are your main concerns, it may be your ace in the hole.

124 **Fujitsu RX7100**
A LaserJet compatible that's not a laser at all, Fujitsu's LED printer is a great idea whose time has not yet come. Low price and smart design are offset by serious drawbacks.

126 **Ricoh PC Laser 6000**
The print quality's swell, but the price is swollen. For the cost of a LaserJet you have a right to expect more: more fonts, more speed, more extras.

Compaq's hot new SLT/286 laptop offers top performance, extremely good portability, nearly 4 hours of battery life, and a sharp VGA display.

Compaq SLT/286

80286 laptop system

PROS: Fast; light; excellent VGA display

CONS: Expensive

Compaq's SLT/286 is the only portable computer currently on the market—with or without a battery—that boasts a VGA display. Nor is that all the good news. This blazing new battery-powered system is exceedingly small, delightfully light, and fast—the fastest 286 laptop we've tested. However, at $8316 (with 2MB of RAM, a 29ms 40MB hard drive, a 1.44MB 3½-inch floppy drive, and a 2400-bps internal modem), it's also quite expensive. If you can live without battery operation, you can get a 16-MHz, 80386-based Toshiba 5100 for about $700 less (see "Portable Power" in this issue).

Although it's thicker than most clamshell-style units, the SLT still measures a diminutive 13 by 9 by 4 inches. Packed up with both the external power supply and the battery, it still weighs in at only 16.6 pounds. Battery life is outstanding; Compaq claims 3 hours, but in actual use the machine was still chugging away after nearly 4.

The SLT's 80C286 CPU runs at 12 MHz, and RAM can be expanded to 4MB on the motherboard. If two 8/16-bit expansion slots are on your wish list, you'll need to spend another $999 for a deskbound expansion unit (called a docking module).

The SLT/286's performance is stunning. Not only does it take first place among all the 286 transportables tested by National Software Testing Laboratories (NSTL), it even beats the Compaq Deskpro 286. It passed the NSTL Crash Test without incident.

The SLT/286's 8-by-6-inch, white-on-black, fluorescent backlit VGA screen is slightly streaky, but it displays 12 distinct shades of gray—an unusual abundance. The removable keyboard has a solid touch, and

while the numeric pad is embedded in the alpha keys, it toggles on and off with a press of the <Num Lock> key.

The SLT/286 comes with utilities for disk caching and EMS 3.2–compatible memory management. Performance, portability, and especially the beautiful display are tops. The SLT's only significant drawback is its high price, but in this instance, price and value are directly related. —*John Diebold*

WHERE TO BUY

Compaq SLT/286
Compaq Computer Corp.
20555 FM 149
Houston, TX 77070
800/231-0900
LIST PRICE: Model 40 with 640K RAM, 40MB hard disk, 1.44MB 3½-inch floppy drive, backlit VGA-compatible display, one parallel port, one serial port $5999; Model 20 with 20MB hard drive $5399
ACCESSORIES: 1MB RAM expansion $799, CMOS 80287-12 coprocessor $799, external storage module $299, 40MB tape drive $799, 5¼-inch 1.2MB floppy drive $275, desktop expansion base $999, 2400- bps internal modem $599, external numeric keypad $149
WARRANTY: one year limited
EXTENDED WARRANTY: none
TECHNICAL SUPPORT: toll-free number, M–F 7 a.m.–9 p.m.
OTHER SUPPORT SERVICES: none
Reader service no. 680

Acer LP-76

LaserJet-compatible printer

PROS: Low price, excellent warranty, fast graphics printing

CONS: Slow text printing

Fujitsu RX7100

LaserJet-compatible printer

PROS: Low price, single-cartridge replacement of consumables

CONS: Slow; mediocre print quality

FEATURES EVALUATION

Compaq SLT/286: Pricey but Powerful

Compaq's hot new 12-MHz 286 laptop features VGA graphics and a highly readable fluorescent backlit screen (with a full 180-degree tilt)—all packed into a featherweight 16.6-pound package.

● Yes
○ No

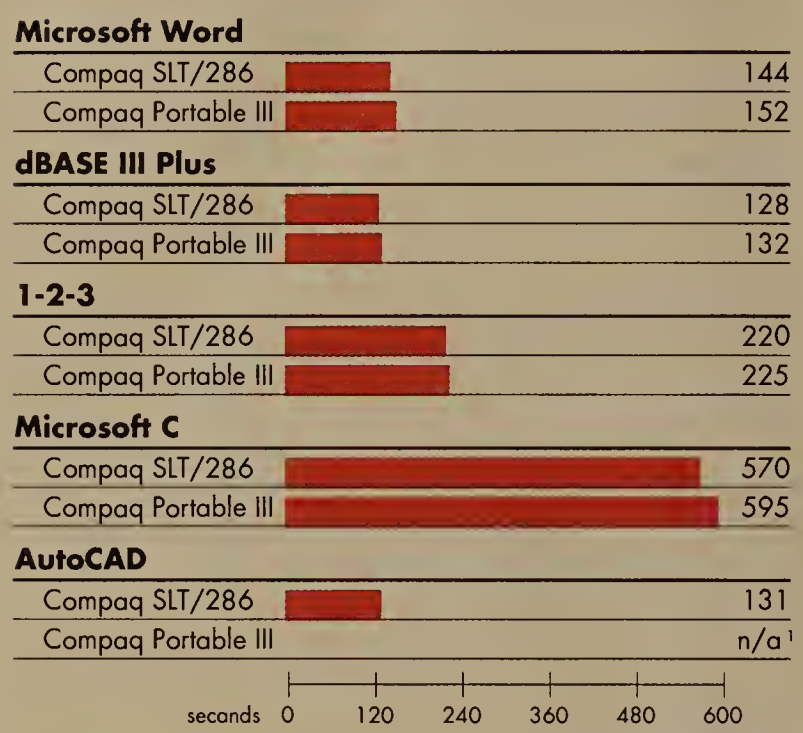
	Compaq SLT/286	Compaq Portable III
Standard features		
Price	$8316 [1]	$7660 [2]
CPU	80C286	80286
Clock speed	12 MHz	12 MHz
Coprocessor support	●	●
Disk-caching software included	●	●
Standard floppy drive	1.44MB	1.2MB
Memory bus capacity	4MB	6.6MB
Expandability		
Expansion slots	0 [3]	0 [3]
Portability		
Weight (pounds)	16.6	21.7
Volume (cubic inches)	546	1152
Automatic head parking	●	●
Ergonomic design		
Display		
Screen type	fluorescent backlit LCD	gas plasma
Mode	VGA	CGA [4]
Screen tilt, degrees	180	30
Switchless installation	●	○
Complete documentation	●	●
Front-panel reset button	○	○
Dedicated number pad	○	●

[1] Price based on 2MB RAM, 40MB hard drive, 3½-inch 1.44MB drive, fluorescent backlit LCD VGA-compatible display, a 2400-bps internal modem, one serial port, one parallel port, DOS 3.3.
[2] Price based on same configuration as in footnote 1 except 5¼-inch 1.2MB floppy drive, gas plasma CGA-compatible display.
[3] Slots available via optional desk-bound expansion chassis.
[4] 640 by 400 graphics mode for some applications.

NSTL TEST REPORT

Compaq's Blazing SLT/286

Compaq's laptop is the fastest 286 portable ever reviewed by PC World.



Methodology
Both machines were tested with a coprocessor and a disk cache consisting of 256K in extended memory for all tests except the *1-2-3* benchmark. The 12-MHz Compaq SLT/286 was configured with a 43MB hard disk and 4MB of RAM. The 12-MHz Compaq Portable III was configured with a 21MB hard disk and 1MB of RAM.

Microsoft Word 4.0
A *Microsoft Word* macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

dBASE III Plus 1.1
The *dBASE III Plus* test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

1-2-3 2.01
In this benchmark, a *1-2-3* macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

Microsoft C 5.0
The *Microsoft C* benchmark measures the time required to compile and link *XLISP*, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

AutoCAD 9
In this benchmark, a three-dimensional sample drawing is retrieved and displayed using *AutoCAD*'s EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

[1] Does not support AutoCAD's EGA mode.

Ricoh PC Laser 6000

LaserJet-compatible printer

PROS: 1MB RAM standard

CONS: Slow, expensive

The HP compatibles keep on coming. Three new low-end laser printers have appeared on the market—from Acer, Fujitsu, and Ricoh. All three are rated for relatively light duty (3000 pages per month, compared with the HP LaserJet's 5000), and all three offer HP compatibility (although Ricoh charges extra for it). Beyond that, they have very different capabilities and prices.

Acer LP-76

At $1995, the Acer LP-76 lists for $700 less than a LaserJet Series II. Thanks to its Ricoh 1060 print engine, it also produces better-looking output—sharper lines, more consistent blacks, and better tonal range. Unfortunately, the Ricoh engine uses flimsy plastic parts and probably won't last as long as a LaserJet's.

On many other counts, the Acer LP-76 compares favorably. Although toner, developer, and photoconductor cartridge must be replaced in three separate operations, the process is simple. Acer offers the same six resident fonts as the LaserJet II, plus 21 proprietary font cartridges. The printer's 512K of RAM can be upgraded to 4.5MB (same as the LaserJet II), the control panel is easy to use, and LaserJet II emulation seems solid. Moreover, Acer's guarantee is outstanding: During the first four months of the one-year warranty, on-site repair and adjustment are free.

Text printing speed is not one of the Acer's strong points; at only 6 ppm, it's significantly slower than the LaserJet II (rated at 8 ppm). But the Acer is much faster on graphics, and it outpaced the LaserJet II (results not shown) at printing mixed text and graphics as well.

Should you buy the Acer LP-76 instead of the LaserJet Series II? As usual, the answer is a clear-cut maybe. If your office printing

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VGA VGA monitor¹. VGA adaptor, 640x480 by 16 colors. | $2,495 or $90.20/month | $3,095 or $111.89/month | $3,295 or $119.12/month
VGA-Plus VGA monitor¹. VGA adaptor, 800x600 by 16 colors. | $2,595 or $93.82/month | $3,195 or $115.51/month | $3,395 or $122.74/month
¹Monitors are 14" diagonal; VGA monitor is IBM VGA compatible; VGA-Plus monitor is NEC Multisync-compatible. ²Mono/graphics adaptor is Hercules-compatible and includes one parallel printer port. ³Hard disks have high-speed voice-coil actuators and auto-park heads.
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Circle 287 on reader service card

FEATURES EVALUATION

Low-Cost LaserJet Clones Fall Short of the HP

Three LaserJet-compatible printers beat HP's price but fail to match its rated speed or paper-handling convenience.

● Yes
○ No
◒ Deficient

	Acer LP-76	Fujitsu RX7100	Ricoh PC Laser 6000	HP LaserJet Series II
Standard features				
List price	$1995	$2395	$2495	$2695
Print engine	Ricoh 1060	Fujitsu RX7100	Ricoh 1060	Canon LBP-SX
Maximum rated engine speed	6 ppm	5 ppm	6 ppm	8 ppm
Emulation modes				
LaserJet Plus or Series II	●	●	◒[1]	n/a
Epson	◒[1]	◒[1]	◒[1]	○
Diablo	◒[1]	◒[1]	●	○
Other	◒[1]	◒[1]	◒[1]	○
Memory				
Standard memory	512K	640K	1MB	512K
Maximum expansion memory	4.5MB	4.6MB	2MB	4.5MB
Fonts				
Courier and line printer resident fonts	●	●	●	●
Other resident fonts	○	○	●	○
Accepts HP font cartridges	○	○	○	●
Total available "HP" font cartridges	21	17	11	all
Paper handling				
Maximum input pages (without accessories)	150	150	150	200
Maximum input bins (without accessories)	1	1	1	1
Accepts envelopes	●	●	●	●
Maximum output pages	150	150	150	200
Output facedown, faceup, or choice	choice	facedown, faceup optional	choice	choice
Consumables				
Number of user-replaceable components	3	1	3	1
Consumables cost per page (cents)	3.9	3.1	3.9	3.6
Interfaces				
Parallel or serial	parallel	both	both	both

[1] Optional.

needs are under 3000 pages a month and you're willing to give up third-party hardware support, the Acer LP-76 is a great buy. On the other hand, if you're concerned about long-term wear and text-printing speed, your best bet lies elsewhere.

Fujitsu RX7100

Although it is a LaserJet compatible, Fujitsu's new printer is not, strictly speaking, a laser printer at all—it's an LED (light-emitting diode) printer. Like the LaserJet, it combines toner, developer, and imaging drum in one convenient cartridge. Other intelligent design features include a paper-exit tray that flips out of the way when not in use.

At $2395, the Fujitsu RX7100 lists for $300 less than the LaserJet. (A dual-tray model costs $2555—still less than the single-bin LaserJet II and far less than any other dual-bin laser printer.) It comes with 640K of RAM, and while that's not enough for a full page of graphics, you can expand memory to a generous 4.6MB.

Like the LaserJet Plus, the Fujitsu has only three resident fonts; 32 proprietary font cartridges are available, but only 17 claim compatibility with HP LaserJet software drivers. Documentation is decent, and the six-button control panel is a good deal easier to use than the one on the LaserJet II.

The bad news is that the Fujitsu is slow. The engine is rated at a poky 5 ppm, and to make matters worse, the printer's controller processes both text and graphics at a snail's pace. In all four NSTL tests, the Fujitsu RX7100 ran last.

Simple text printouts looked fine, but getting acceptable results with pages that combined text and graphics was a problem. No amount of fiddling with the print density dial produced an acceptable balance. In many cases, fine lines and the edges of letters showed fat jaggies.

Should you buy the Fujitsu RX7100? Its low price and intelligent construction are admirable, but they don't make up for snail-like speed and disappointing print quality.

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Circle 14 on reader service card

Acer's LP-76 produces better-looking output than the LaserJet II, for $700 less.

Ricoh PC Laser 6000

At $2495, Ricoh's new printer beats the price of a LaserJet II by a mere $200. Worse, it is significantly slower than the LaserJet II, and you pay an extra $199 for LaserJet emulation, wiping out any price advantage.

Ricoh supplies the same print engine to Acer, and in some respects the printers are similar. Both offer excellent print quality, and both run at the same relatively slow 6 ppm on text-based tests. In NSTL's graphics benchmarks, the Ricoh PC Laser 6000 proved a bit slower than the Acer, but mix in text, and the Ricoh is 50 percent slower.

The printer comes with a megabyte of memory, enough to handle a full page of graphics, but tops out at only 2MB. It provides only four resident fonts—one more than the Plus and two fewer than the II. Ricoh offers a scant 11 proprietary font cartridges.

In most respects, the Ricoh PC Laser 6000 is little better than mediocre: Documentation is OK, front-panel controls are adequate, and the warranty is ordinary. Considering the machine's slow performance and LaserJet-compatible price, it must be considered an also-ran. —*Daniel Miles Kehoe*

POWER TIP NO. 49

How to Recover the LaserJet's Last Page

Sometimes the HP LaserJet prints a document sans the last page. The LaserJet requires a formfeed line command in order to print a page and some applications don't automatically add the command. You can print the missing last page by pressing the On Line button on the control panel (to toggle the printer off line) and then pressing the Form Feed key.

Ellison Kwan
San Francisco, California

WHERE TO BUY

Acer LP-76
Acer Technologies Carp.
401 Charcot Ave.
San Jase, CA 95131
800/538-1542, 800/782-1155 Californio, 408/922-0333
LIST PRICE: $1995
ACCESSORIES: font cartridges $135 ta $240; serial interface $65; paper troy $499; 1MB memory upgrode $475, 2MB memory upgrade $950; toner (six-pack) $168; phatoconductor cartridge $199; cleaning unit (developer) $99
WARRANTY: ane year parts and labar, includes four manths TRW an-site service, eight manths depot service
EXTENDED WARRANTY: through TRW
TECHNICAL SUPPORT: tall-free number, M–F 8:30–5:30
OTHER SUPPORT: none
Reader service no. 681

Fujitsu RX7100
Fujitsu America Inc.
3055 Orchard Dr.
San Jose, CA 95134-2017
800/626-4686, 408/432-1300
LIST PRICE: $2395, two-bin madel $2555
ACCESSORIES: 1MB memory upgrade $495, 2MB memory upgrode $995, 4MB memary upgrade $1995; fant cartridges $145 to $195; input troy $395; HP GL emulatian card $149, IBM Praprinter/Epsan FX-85 emulatian card $129, Diablo 630 emulatian card $99; taner cartridge $185; azane filter $15
WARRANTY: ane year parts and lobor
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COREL

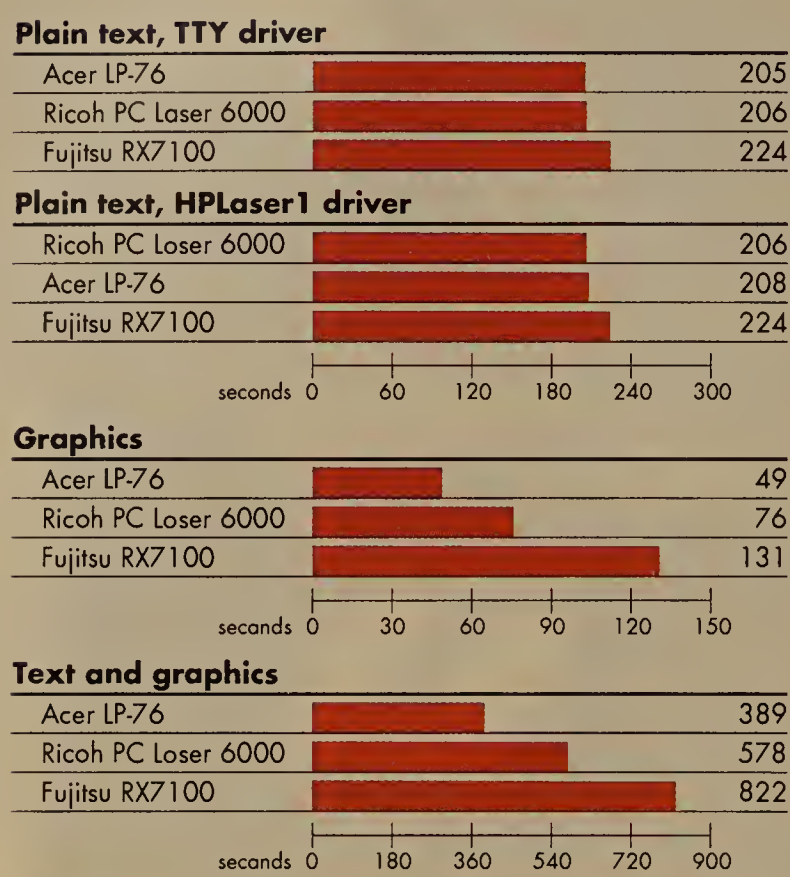
COREL Systems Corporation 1600 Carling Avenue, Ottawa, Ontario K1Z 8R7 Tel:(613) 728-8200 Fax:(613) 728-9790

Circle 48 on reader service card

NSTL TEST REPORT

Acer Aces Laser Printer Trials in Graphics

All three of these LaserJet clones bunch closely on text printing, but when it comes to graphics, Acer's LP-76 is the clear winner.



Methodology
Benchmarks were conducted using a 12-MHz Compaq Deskpro 286 Model 40 equipped with 1.2MB of RAM. Text printing speed was tested using a typical business document created with *Microsoft Word 4.0*. Graphics printing speed was tested using a *1-2-3* graph. *PageMaker* version 1.0a was used to test the printers' ability to produce text and graphics on the same page. Timing began when the command to print was issued and ended when the last page came to rest in the output tray.

Plain text, TTY driver
This benchmark timed the printing of 20 pages of plain text without enhancements or formatting using *Word's* TTY printer driver.

Plain text, HPLaser1 driver
This benchmark timed the printing of the same 20 pages of plain text using *Word's* HPLaser1 printer driver.

Graphics
This benchmark timed the printing of a *1-2-3* stacked bar chart using the Hewlett-Packard LaserJet Plus driver with the high-density option.

Text and graphics
This benchmark timed the printing of an 8-page newsletter containing text and graphics—various type sizes and fonts, a scanned photo, and a line drawing—using the HP Series II printer driver.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

TECHNICAL SUPPORT: toll-free number, 24 hours a day seven days a week
OTHER SUPPORT SERVICES: none
Reader service no. 682

Ricoh PC Laser 6000
Ricoh Corp.
Peripheral Products Division
3001 Orchard Pkwy.
San Jose, CA 95134
800/RICOHUS, 408/432-8800
LIST PRICE: $2495
ACCESSORIES: .5MB memory upgrade $249, font cartridges $250, input tray $499, emulation cards (including HP LaserJet Plus) $199, toner $29, photoconductor cartridge $199, cleaning unit (developer) $99
WARRANTY: 90 days parts and labor
EXTENDED WARRANTY: one year parts and labor, depot service $375
TECHNICAL SUPPORT: no toll-free number, M–F 9–7
OTHER SUPPORT SERVICES: none
Reader service no. 683

John Diebold is a marine geophysicist specializing in computer analysis of seismic data, and Daniel Miles Kehoe often reviews laser printers for PC World. ●

POWER TIP NO. 50

First-Character Wild Cards With WordPerfect

You can't use *WordPerfect 5.0's* wild-card Search character (^X) as the first character of a search string. To get *5.0* to search for strings with any first character, enter a space in place of the first character in the string, press <Ctrl>-V<Ctrl>-X, and then enter the remainder of the search string.

Sue Kim
San Francisco, California

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Suggested Retail Price	**$29.00**	**$49.95**	**$219.98**	**$179.95**
Account Balancer	YES	YES	YES	YES
- Automatic Error Finder	YES	NO	NO	NO
Accounts Can Be Added When Entering Transactions (Data)	YES	YES	YES	NO
Budgeting	YES	YES	YES	YES
- Variable Budgeting By Month	YES	NO	YES	YES
Automatic Transactions	YES	YES	YES	YES
Financial Reports				
- Actual Financial Results	YES	YES	YES	YES
- Month and Year to Date	YES	YES	YES	YES
- All Months On One Report	YES	YES	YES	YES
- Budgeted Financial Results	YES	YES	YES	YES
- Actual Compared to Budget	YES	YES	YES	YES
- Actual Compared to Prior Month	YES	NO	NO	NO
- General Ledger Report	YES	YES	NO	NO
- Accountant's Trial Balance	YES	NO	NO	NO
- Net Worth Computation	YES	NO	YES	YES
Inquiry Reports				
- Check and or Deposit Register	YES	YES	YES	YES
- Account Analysis	YES	YES	YES	YES
- All Transactions with Party	YES	YES	YES	YES
- Cash Requirements Forecast	YES	YES	YES	YES
- Aged Invoices Payable	YES	NO	YES	YES
Graphics	YES	NO	YES	YES
Fiscal Year Support	YES	NO	YES	YES
Optional Password Protection	YES	NO	NO	YES
Financial Calculator	YES	NO	YES	YES
- Prints Amortization Schedules	YES	NO	YES	YES
- Prints Accumulation Schedules	YES	NO	YES	YES
Mail List Manager	YES	NO	YES	YES
- Prints Address Labels	YES	NO	YES	YES
- Prints Index Cards	YES	NO	YES	NO
- Prints Telephone Directory	YES	NO	YES	NO
- Mail Merge with Word Processor	YES	NO	YES	YES
Check Writer	YES	YES	YES	YES
- Prints Laser Checks	YES	YES	YES	NO
- Prints Any Pin-Feed Check	YES	NO	YES	YES
Personal Income Tax Estimator	YES	NO	YES	YES
Pop-up Note Pad	YES	NO	YES	YES
Pop-up Math Calculator	YES	NO	YES	YES
Capacity				
- Total Number of Accounts Per File	999	300	*	120
- Total Number of Open Transactions	100,000	65,535	*	4,000

*Varies based on RAM memory and disk space available.

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INSIDE THE SOFTWARE SHELF

132 **Freelance Plus 3.0**
Devotees of this popular business graphics program will cheer the added charting power, data-to-chart linking feature, and desktop presentation ability, but the speed gain is slim and its RAM appetite is hefty.

134 **Mace Gold, PC Tools Deluxe 5.0**
Two solid collections of hard disk utilities give Peter Norton a run for his money. *Mace Gold* adds computer virus "vaccines" and power failure protection, but *PC Tools'* integrated design garners it a Best Buy.

136 **Turbo C 2.0**
Borland's improved compiler makes writing and debugging programs quicker and easier than ever. Context-sensitive debugging and an integrated environment make this package a good choice for novices and veterans alike.

140 **AutoCAD Release 10**
Multiple windows, 3-D drawing power, and a system for uniquely identifying objects in a drawing highlight this upgrade, but it still carries some of release 9's shortcomings.

142 **dSalvage 1.43**
Accidentally Zap a *dBASE* file? This lifesaving data base utility will retrieve your file from limbo and diagnose and repair most other kinds of file damage. A Best Buy.

Freelance Plus produces charts easily, but drawing this image required multiple saves and tedious color manipulation.

Freelance Plus 3.0

Business graphics program

PROS: Expanded charting and drawing, new data-linking and desktop presentation features, scanned image support

CONS: Doesn't support gray-scale images, no slide-service-bureau support

As a business graphics program with integrated charting and drawing tools, *Freelance Plus* has always been popular, especially with *1-2-3* users (see "Business Graphics Roundup," *PCW*, July 1988). A charter member of the Lotus family, it offers a familiar interface and hassle-free importing of *1-2-3* worksheet and graphics files.

Yet *Freelance Plus* hasn't wrested the business graphics crown from Software Publishing's *Harvard Graphics*, and it also faces competition from newcomers like Ashton-Tate's *Draw Applause* (see *The Software Shelf*, *PCW*, October 1988). Its interface and tree-structured menus make creating charts on the fly harder than with *Harvard*, and it can't match the blended shades or spiffy special effects available from *Draw Applause*. On the plus side, its chart/editing features equal *Draw Applause*'s and are stronger than *Harvard Graphics'*, which still lacks the ability to zoom in on a chart.

Freelance Plus 3.0 gives Lotus loyalists new charting power, a nifty data-to-chart linking feature, improved drawing tools, scanned image import capability (although not for gray-scale files), and competent desktop presentation. However, the program isn't much faster than version 2.0, and it gobbles up more RAM (up from 384K to 640K) without supporting expanded memory. And unlike competing programs, *Freelance Plus* still doesn't use an overnight slide service bureau like MAGICorp.

Freelance Plus's new charting features include area, bar/line, high/low/close, and table charts, as well as 3-D effects for bar and pie charts. The program also packs new axis options, automatic boxes and drop shadows for headings and legends, and support for

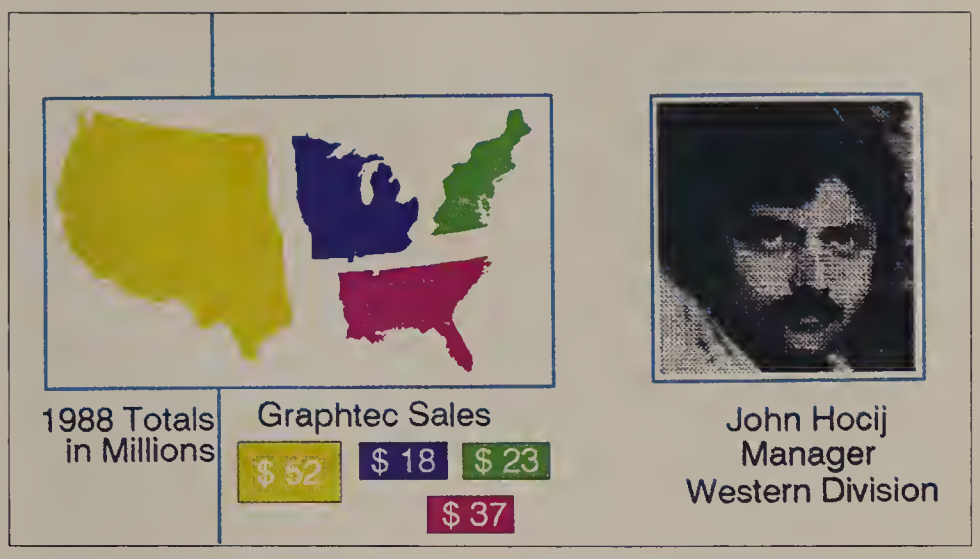
new fonts, including Bitstream outline fonts.

A big productivity plus in version 3.0 is dynamic links between a chart and its external source file. Retrieve any chart, and it's automatically updated with the latest data from the source file. And you can view linked data in a spreadsheet or data base file while you're still in *Freelance Plus*.

For chart editing and enhancement, *Freelance Plus*'s excellent drawing tools are better than ever, with new alignment, snap-to-object, and curve-smoothing commands. For nonartists, *Freelance Plus 3.0* now includes nearly 900 symbols and maps (many in color), as well as templates you can use as backdrops for diagrams, organization charts, and other text charts.

Thanks to *Freelance Plus 3.0*'s new TIFF import capability, you can dress up a chart by incorporating scanned images—a nice snapshot of the CEO, say. But *Freelance Plus* supports only non-gray-scale TIFF images made with Hewlett-Packard's popular *Scanning Gallery*, so you'll have to settle for a dithered black-and-white image. And *Freelance Plus* doesn't display the image itself, just a rectangle bearing the name of the TIFF file. You can move, resize, flip, or rotate a TIFF file as you construct a chart, but you have to print it out to proof the results. With the recently released *Xerox Presents*, on the other hand, you can conveniently display scanned images on screen as you work (see the review in the special *Windows* section in this issue).

Once you create a series of charts, you can use *Freelance Plus 3.0*'s new Portfolio module to organize and batch-print presentations, and use its versatile Screen Show module to script and display desktop slide shows. For the more visually demanding, *Freelance Plus*'s .GX2 slide files are compatible with the newest version of *Show Partner F/X*, a dedicated presentation package (see *The Software Shelf, PCW*, August 1988). Output file formats include EPS, TIF, and CGM, plus you can print VideoShow and HPGL



Thanks to Freelance Plus's new ability to import TIFF files, you can now gussy up a sales report with a scanned photo of a company officer.

plotter files to disk for importing into *Ventura Publisher* and *PageMaker*.

When *1-2-3* release 3.0 finally arrives, *Freelance Plus* users are guaranteed to hit the ground running because *Freelance* already supports Lotus's new three-dimensional worksheets. You'll be able to import not only .WK3 files, but also data from a row or column from one or more consecutive release 3.0 worksheets.

Freelance Plus is a fine first choice as an all-purpose business graphics program, and version 3.0 is a solid upgrade. But users accustomed to friendlier interfaces may prefer such *Windows*-based programs as Micrografx's *Graph Plus*, Zenographics' *Pixie*, and now *Xerox Presents*. —*Richard Jantz*

WHERE TO BUY

Freelance Plus 3.0
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500, 617/253-9150 (tech support)
LIST PRICE: $495
REQUIREMENTS: 640K, two disk drives, DOS 2.1 or later version
TECHNICAL SUPPORT: unlimited, no toll-free number, T–Th 8:30–8, M, F 9:30–8; extended support including quarterly newsletter, guide, toll-free number $150 per year
OTHER SUPPORT SERVICES: 90-day money-back guarantee, quarterly newsletter free to registered graphics users, CompuServe forum (GO LOTUSB), training materials available
Reader service no. 690

```
                              MACE
   Features   Undelete   Remedy   Sortd   More   Quit [Esc]

FFIND      -- locates all copies of a file on any drive.
FORMAT-F   -- safe floppy format program, allows recovery from mistakes.
FORMAT-H   -- safe hard disk format program, allows recovery from mistakes.
DbFIX      -- recovers, repairs damaged or lost DBase files.
TextFIX    -- recovers, repairs damaged or lost word processing documents.
MACE       -- optional master menu, for those who prefer it.
MCACHE     -- uses regular memory to speed disk access.
MCACHE-AT  -- uses extended memory to speed disk access.
MCACHE-EM  -- uses expanded (EMS) memory to speed disk acccess.
MUSE       -- Mace Utilities intelligent sector editor
POP        -- Power Out Protection software.
RXBAK      -- creates protective file for perfect undelete or recovery.
SETPOP     -- installs and uninstalls POP.
SORTD      -- sorts directories on one or two fields.
SQZD       -- cleanse directories to speed up disk access.
SYSTAT     -- displays technical information about your computer system.
UNDELETE   -- recovers deleted or erased files.
UNFORMAT   -- recovers from accidental format or other disasters.
UNFRAG     -- reorganizes fragmented files to speed disk access.
VACCINE    -- computer virus protection.
```

Mace Gold's main menu lists the features of its various utilities, some of which must be invoked from the command line.

Mace Gold

Hard disk maintenance package

PROS: Solid array of basic disk utilities; computer virus and power failure protection

CONS: Many utilities must be run from the DOS prompt

PC Tools Deluxe 5.0

Hard disk maintenance package

PROS: Good disk utilities, file encryption, memory-resident desktop accessories, flexible menus

CONS: None

Peter Norton may still be wearing the smile of a hard disk utility champ, but a pair of serious contenders would love to wipe it right off his face. Like *The Norton Utilities* (see *The Software Shelf, PCW,* April 1989), *Mace Gold* and *PC Tools Deluxe 5.0* are useful enough for shuffling files, but they're vital if you suddenly need to retrieve data from an accidentally formatted disk drive (see "How to Recover From Hard Disk Disaster" in this issue).

Mace Gold and *PC Tools* offer many of the same valuable features as Norton's package —and add some important extras. Both can undelete files and unformat disks, lock out bad disk sectors, back up and restore quickly, and unfragment files. The new versions are notable upgrades, and *PC Tools'* nifty desktop utilities make *5.0* a watershed release.

Mace Gold offers a memory-resident "vaccine" designed to protect files against computer viruses, protection against data loss due to power failure, and application-specific features that let you restore some *dBASE* and word processing files that wouldn't be recoverable at all without a sophisticated understanding of their file formats. *PC Tools,* on the other hand, offers mouse support, a set of memory-resident desktop accessories that resemble those in *SideKick Plus* (but require only 40K of RAM), and a DOS shell reminiscent of *Norton Commander* (see *The Software Shelf, PCW,* August 1988 and January 1989, respectively).

Apart from its vaccine program, which offers two levels of virus protection, *Mace Gold*'s most impressive feature is a memory-resident program called Power Out Protection that regularly copies the entire contents of your computer's RAM to a hidden disk file. If the lights go out, you can restore programs and data to RAM in their exact state at the time of the last automatic memory snapshot—even if you were using an application.

PC Tools shines in the usefulness of its desktop accessories. The notepad is practically a full word processor, with search and replace, a spelling checker, and various formatting options. An appointment calendar includes daily and monthly calendar views, appointment alarms, and a to-do list. The Desktop's data base module reads *dBASE* files directly and searches for specific records, though you can't display records in row-and-column format. The Desktop also includes macros, outlining, basic telecommunications, a calculator, and a clipboard.

Of the two packages, *PC Tools* is noticeably better integrated. Like previous versions of *Mace Utilities, Mace Gold*'s main menu options are limited, so you often wind up working from the DOS prompt. If you call *Mace Gold*'s file sort program from the main menu, for example, it sorts only the current

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- Full international character set

Interactive Kerning
- Characters can be dragged until you see the exact spacing you want
- Individual characters can have different attributes within a text string including typeface, point size, angle etc.

Fit Text to a Curve
- Text can easily be snapped to any curve including circles, rectangles, or even other text

Fit Text to a Space
- Interactive letter, word and line spacing

Edit Lettershapes
- Start with any font you want, then create your own custom lettering

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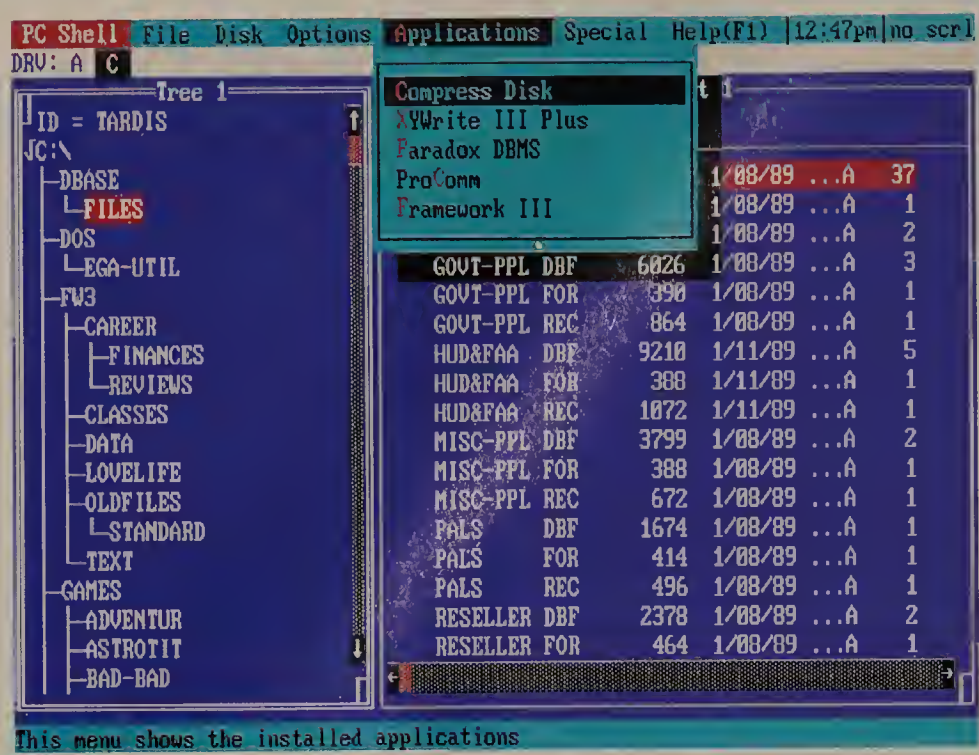

PC Tools' PCShell utility displays a directory tree on the left, a file listing on the right, and the Special user-created applications menu.

directory; to sort other directories, you have to run the utility from the command line. And *Mace Gold*'s unfragment program doesn't tell you if your disk actually needs optimizing; that's handled by another utility (Fragchk), which must be invoked separately.

By contrast, the individual *PC Tools* utilities display a full range of options no matter how they're invoked. From its point-and-shoot menu, for example, the Compress optimizer matches the functions of *Mace Gold*'s Remedy, Sortd, Sqzd, Fragchk, and Unfrag utilities. *PC Tools* even offers a special pull-down menu to which you can add utilities—and even non–*PC Tools* applications—that aren't listed on the main menu.

Mace Gold and *PC Tools* both have "safe" format commands (which don't erase data) to replace DOS's FORMAT command, as well as mirror programs to back up your file allocation table for easier unformatting. Their disk optimizing modules are similar, though they'll feel slow as mud if you're used to a stand-alone program like *Vopt* or *FastTrax* (see "Hard Disk Housekeepers," *PCW*, June 1988).

Mace Gold is a much-improved product, but despite its power-failure and virus-protection features, it's essentially a collection of separate utilities. *PC Tools* is a more smoothly integrated whole, enhanced by its well-conceived desktop and shell programs. The important thing is that you have one of the packages on hand when trouble strikes your computer—as eventually, it surely will.
—*Scott D. Palmer*

WHERE TO BUY

Mace Gold
Paul Mace Software
400 Williamson Way
Ashland, OR 97520
503/488-0224
LIST PRICE: $149
REQUIREMENTS: 256K, DOS 2.0 or later version
TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 8–12, 1–4
OTHER SUPPORT SERVICES: free quarterly newsletter
Reader service no. 691

PC Tools Deluxe 5.0
Central Point Software, Inc.
15220 N.W. Greenbrier Pkwy. #200
Beaverton, OR 97006
503/690-8090
LIST PRICE: $79 (introductory)
REQUIREMENTS: 9K (Desktop requires 40K), two disk drives, DOS 3.0 or later version
TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 8–5
OTHER SUPPORT SERVICES: none
Reader service no. 692

Turbo C 2.0

C compiler

PROS: Built-in source level debugger, produces .COM files directly, compiles and links programs quickly, supports in-line assembly code

CONS: Can't compile OS/2 programs, no mouse support, incomplete linker utility

If you program in C—or want to learn—take a serious look at *Turbo C 2.0*, the latest incarnation of Borland's fast, easy-to-use compiler. By adding integrated source code debugging to its already famous program development environment, *Turbo C 2.0* can hold its own against Microsoft's just-released *QuickC 2.0* compiler (see the preview, *PCW*, April 1989), and rivals the performance of the much more expensive *Microsoft C 5.1*. While the product's linker has some flaws, *Turbo C 2.0* is a solid addition to the Borland language line.

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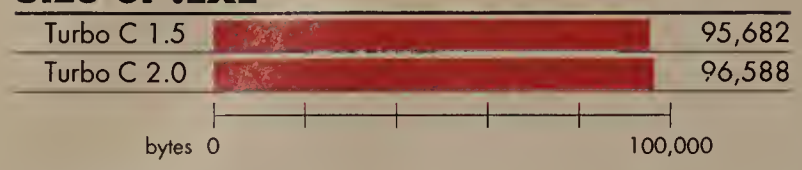
NSTL TEST REPORT

Turbo C 2.0: New Zip

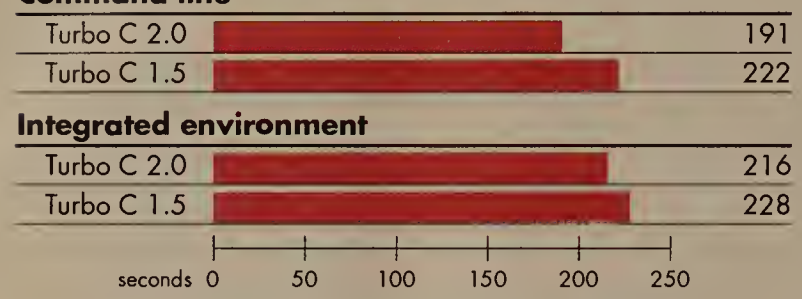
Version 2.0 sets a brisker pace than 1.5.

Size of .EXE



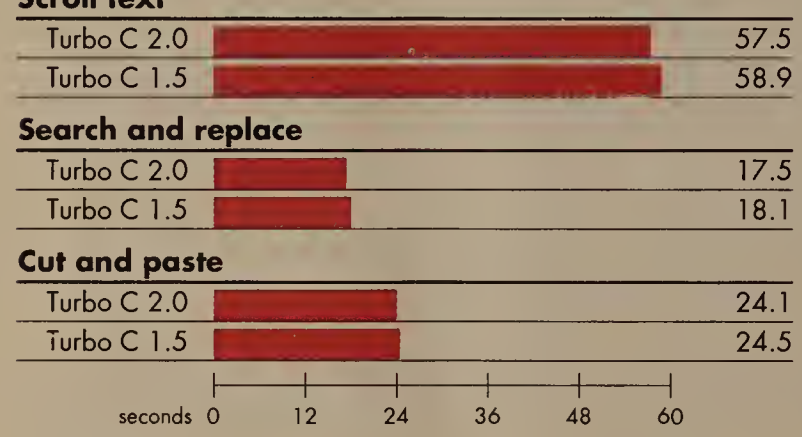
Compile Time

Command line



.EXE Performance

Scroll text



Methodology
All tests were performed on o 12-MHz Compoq Deskpro 286 with o 20MB hord disk and 1.1MB of RAM. MicroEMACS 3.9, o text editor written in C, wos used to test the C compilers. MicroEMACS is o public domoin version of EMACS, on editor long populor among progrommers ond noted for its powerful mocro copobility. The execution speed of o set of MicroEMACS's mocros wos used to compare the quolity of code generated by the compilers. Compilotions were optimized for speed. There wos no significont difference between the source code used for the compilers.

Size of .EXE
The size of the executoble file produced by o compiler.

Compile Time
The omount of time thot it took to compile MicroEMACS from the commond line ond from within the integroted environment.

.EXE Performance
Three mocros were used to test the execution speed of each compiler's resultont .EXE (executoble) file. The first mocro, Scroll text, looded MicroEMACS's 1472-line source code file (MAIN.C) ond scrolled from the top line down to the end of the file. Explicit colls to the "updote-screen" mocro commond were mode to reflect eoch scrolling operotion on the screen. The second mocro, Seorch ond replace, looded the some MAIN.C file ond replaced oll occurrences of *if* with *nstl*. Screen I/O was minimized for this test. The lost mocro, Cut ond poste, performed several "kill-region" operotions; "kill-region" deleted o block of text while copying the block to the scrap buffer.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

ment that makes *Turbo C 2.0* a pleasure to use. It's a multiple-window editor in which you write, compile, debug, and execute programs. When an error crops up in a program you're running or compiling within the environment, a pop-up window displays an error message and you're whisked back into the editor, with the cursor on the line where the error occurred. This kind of context sensitivity drastically cuts the gap between program idea and bug-free product. One glaring omission: Although you can write programs that use a mouse, *Turbo C* itself doesn't.

Until recently, Microsoft's *QuickC* debugger had a distinct advantage over *Turbo C*'s. With version 2.0, *Turbo C* rights the imbalance and adds several debugging conveniences that even *QuickC 2.0* doesn't offer. *Turbo C 2.0* lets you step through source code execution a line at a time; set breakpoints; define watch variables and watch expressions; trace into or skip over functions; and view program code in C, assembly language, or a mixture of both. With *QuickC 2.0*, by contrast, you can view program code only in the source language; viewing mixed source and assembly, or pure assembly, language requires Microsoft's *CodeView* debugger.

Turbo C also supports the "tiny" memory model (in which code and data must fit in 64K) and can produce small, fast .COM files directly. Furthermore, the entire *Turbo C 2.0* library is available from within the integrated environment. Finally, *Turbo C 2.0* provides a command-line compiler that feels somewhat faster than *QuickC 2.0*'s.

Turbo C 2.0's new linker is speedy but incomplete. It doesn't support overlays and can't link object files created with Microsoft's C or FORTRAN compilers. Like *QuickC*, *Turbo C 2.0* can't compile programs for *OS/2*, a task best left to the more capable *Microsoft C 5.1*.

If you're already programming with *QuickC*, stay with it; converting your programs to *Turbo C* is a big job if they have DOS-dependent calls and use graphics—those Borland library functions differ significantly from Microsoft's. Otherwise, it's a tough call. *QuickC 2.0* has lots of new fea-

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Std Deviation:	24
Minimum:	91
Maximum:	203
Trend Line Slopes	
Entire Range:	1.26
Last Half:	0.98
Seasonality	
Auto(+):	12

Date	Forecast	Upper	Lower	S Factor
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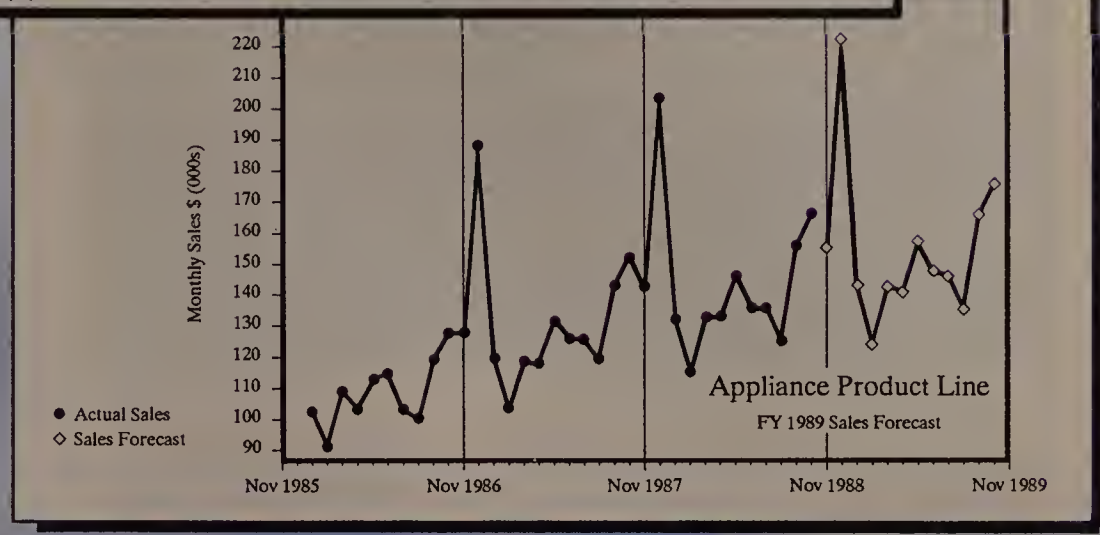
Dec 1988	221	225	217	1.46
Jan 1989	143	148	139	0.95
Feb 1989	124	130	119	0.82
Mar 1989	143	149	137	0.94
Apr 1989	141	148	135	0.92
May 1989	157	164	150	1.01
Jun 1989	147	155	140	0.94
Jul 1989	146	154	138	0.93
Aug 1989	135	144	127	0.86
Sep 1989	166	174	157	1.04
Oct 1989	176	185	166	1.10



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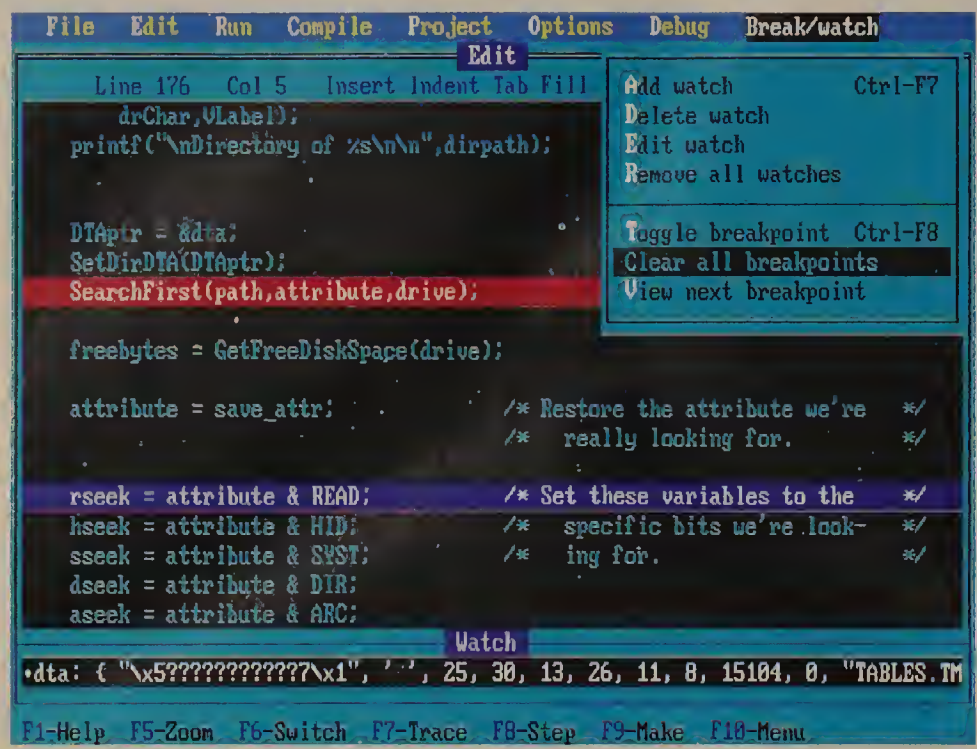

Turbo C can automatically display the contents of structure elements and bit fields in its Watch window.

tures and comprehensive on-line help for C novices and pros alike. Unless one of the two compilers lacks some feature you absolutely must have, you won't go wrong either way.
—*Dennis Dykstra*

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P.O. Box 660001
Scotts Valley, CA 95066-0001
408/438-8400
LIST PRICE: $149.95
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TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 8–5
OTHER SUPPORT SERVICES: CompuServe forum (GO BPROGA), BIX forum (JOIN BORLAND)
Reader service no. 693

AutoCAD Release 10

General purpose CAD

PROS: Much-improved 3-D copobilities, object "hondles" for porometric progromming, links with Autoshode ond Autosolid for 3-D rendering ond onolysis, outomotic hidden-line removol

CONS: Slow when hondling lorge files, limited editing selections, poorly implemented windowing ond ossociotive dimensioning

Each new release of *AutoCAD* poses reviewers a dilemma: Do you praise it for all the spiffy new features, or pan it for not fixing old problems? *AutoCAD Release 10* is typical: an impressive list of commands that are not always implemented in the most useful way.

Release 10 boasts three major new features: multiple windows, expanded 3-D drawing power, and object "handles"—numbers that uniquely identify objects for use in data bases. Other goodies include an improved command for changing the attributes of entities, a tutorial, an expanded-memory version of Autolisp (*AutoCAD*'s programming language), quadratic and cubic B-splines, dynamic zooms, and a Zoom Previous command that can back up through ten prior zooms.

AutoCAD can now display four nonoverlapping windows (called viewports) in a dozen preset combinations. Each window can be zoomed, panned, or regenerated independently, though you can't move windows around the screen or resize them. Only one window is active at a time, but switching windows takes just a click of your pointer button.

The main drawback is that you can't use one window as an overview for controlling the views in other windows. For example, you can't pick a point in an overall view of a drawing, and zoom in on it with another window. Also, you can't add, delete, or rearrange windows in mid-command, as you can in some other programs.

Object "handles" are a hot new feature that makes *AutoCAD* more useful for parametric design and analysis. The Handles command assigns a unique, permanent identification number to each distinct object (line, circle, block, and so on) in a drawing. The number can be read by programs written in Autolisp or used to identify objects included in a .DXF exchange file.

The most dramatic change from *AutoCAD 9* is in 3-D capabilities. The new 3-D entities consist of extruded and ruled surfaces. surfaces of revolution, tabulated cylinders, surface patches, and 3-D polylines, plus some standard parametric objects such as spheres, domes, cones, cubes, pyramids, and toroids.

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Fastback Plus

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One of the fastest, easiest, and least expensive ways to protect against data loss is to invest in Fifth Generation Systems' *Fastback Plus*. Version 2.01 wins the prize for speed, convenience, and user interface that respects level of sophistication you mand from a backup program.

Backup and restore can launched from a command file automatically, if you want to bypass the menus e

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tirely. As for speed, *Fastback Plus* is ready for the next backup diskette before you finish labeling the one you just removed.

Fastback Plus takes the guesswork out of the backup process by showing subdirectories and their contents on a split screen. Files can be selected for backup by name, date range, directory, or archive bit, or they can be marked individually. A particularly nice feature is *Fastback*'s ability to estimate the

BYTE AWARDS

Fastback Plus

Fastback—a program that backs up your hard disk—*is* fast, and it is reliable. Now Fifth Generation has improved it. The company fixed the manuals and then put in help files that make the manuals nearly superfluous. Then it added data compression to save disk space and a utility that estimates how many floppy disks and how long the job will take.

With this program, we've copied 38 megabytes of data from one machine to another in 28 minutes (which included formatting the disks). Fast-

PC WORLD

EXECUTIVE SUMMARY

Fastback Plus 2.0

Hard disk backup utility

BEST BUY

Fastback Plus has state-of-the-art backup features and such extras as a keystroke macro recorder and menu-selectable novice and advanced interfaces. The program is fast.

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Speed				●
Backup selectivity				●
Security				●
Floppy disk handling				●
Overall value				●

Fastback Plus 2.01: No More Backup Excuses

PC HANDS ON

BY EDWARD MENDELSON

The best backup program is the one that gives you the fewest excuses not to use it. Fifth Generation Systems' $189 *Fastback Plus*, Version 2.01, pulls out the rug from under almost every antibackup excuse you can imagine.

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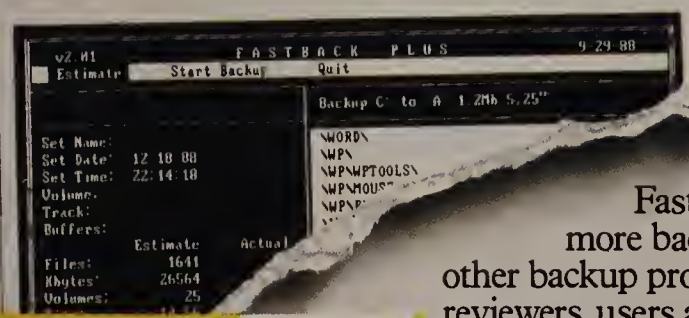
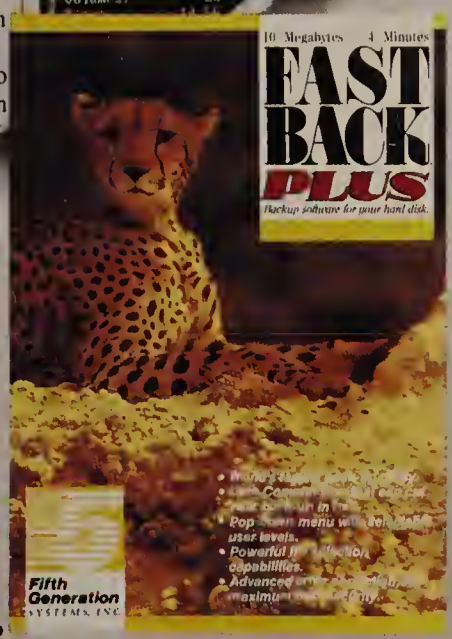


in the program quic



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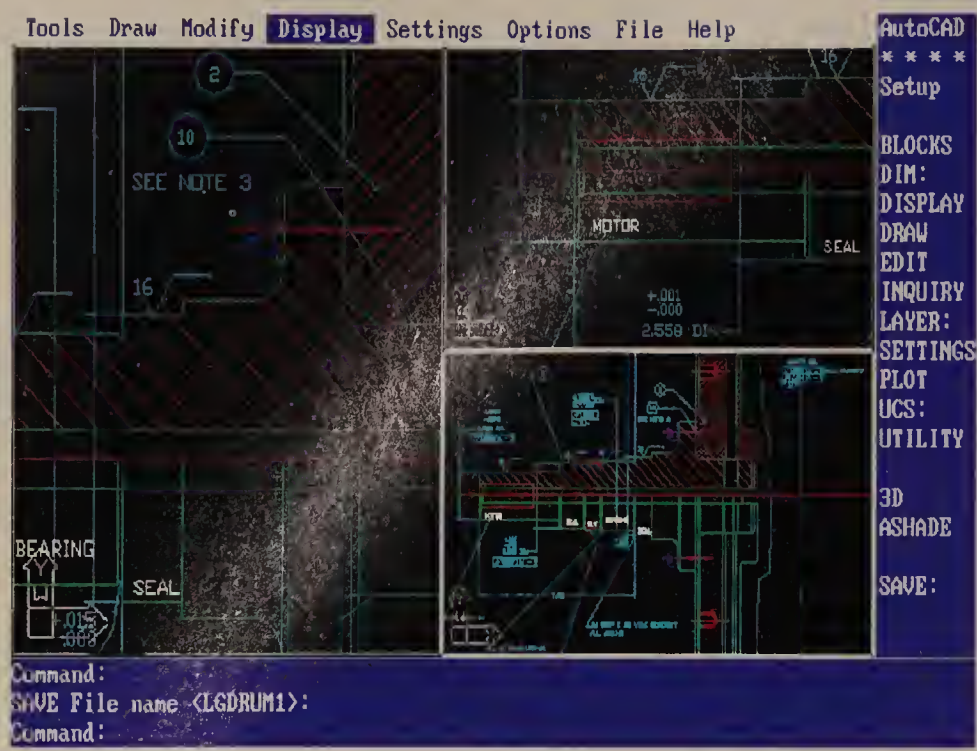

AutoCAD 10's automatic hidden-line removal produced this realistic view of typical 3-D structures.

Three-dimensional curves can also be created by fitting a B-spline to a 3-D polyline.

The 3-D user interface is based on what Autodesk calls the User-Defined Coordinate System (UCS), local coordinates that you generally attach to angles and surfaces. You work mainly on 2-D surfaces defined by the coordinates, even though the overall drawing is three dimensional. This is logical and fairly easy to understand, but setting up the many UCS's in a complex drawing requires a lot of effort.

While you can draw most 3-D shapes fairly easily with *AutoCAD 10*, the editing system and some drawing functions appear only partially integrated into the 3-D world. You can only hatch, fillet, dimension, and draw certain shapes in the x-y plane of the current UCS. Perspective views can't be zoomed or panned, and you can't pick editing or drawing reference points in these views either.

Compared with release 9, 10 is about 20 percent slower at regenerating the screen and 15 percent faster at redrawing the display list. This probably represents a slight decline in performance if you work with large files, but anyone using *AutoCAD* professionally is likely to need a 386 machine in any case.

It's too bad that many of *AutoCAD 9*'s shortcomings carry over into *AutoCAD 10*. You still can't select objects by layer or by color, for example, unless you construct special commands using Autolisp filters. Dimension editing remains clumsy, and the program's associative dimensioning is only effective when all the affected dimensions are in the same dimension format.

Lesser problems also persist from earlier versions. *AutoCAD*'s fillet and chamfer commands still trim off both original lines, whether you want to or not. There is no intraline text editing, nor is there any way to keep a drawing layer visible but not editable.

Autodesk clearly concentrated on adding new 3-D features this time around, and release 10 still shows lots of rough edges. If you really need 3-D drawing, *AutoCAD 10* offers far greater capabilities than earlier versions, though it still isn't as well integrated (or as expensive) as competitors like *CADkey* or Computervision's *Personal Designer*. And if your work is largely 2-D, you will be better off with Evolution Computing's *FastCAD* or Manufacturing and Consulting's *Anvil-1000MD*. —*Steven Lord*

WHERE TO BUY

AutoCAD Release 10
Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965
800/445-5415, 415/331-0356, 415/331-8354 (tech support)
LIST PRICE: $3000, upgrade from release 9 $250
REQUIREMENTS: 512K, hard disk, coprocessor, graphics adapter, mouse or digitizer tablet, DOS 2.0 or later version
TECHNICAL SUPPORT: through dealers, no toll-free number, M–F 8–6
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Reader service no. 694

dSalvage 1.43

dBASE salvage utility

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CONS: Quirky user interface, can't repair damaged .DBT memo files

Paul Heiser is the Peter Norton of the *dBASE* world, and the author of its bible, *Salvaging Damaged dBASE files* (Comtech

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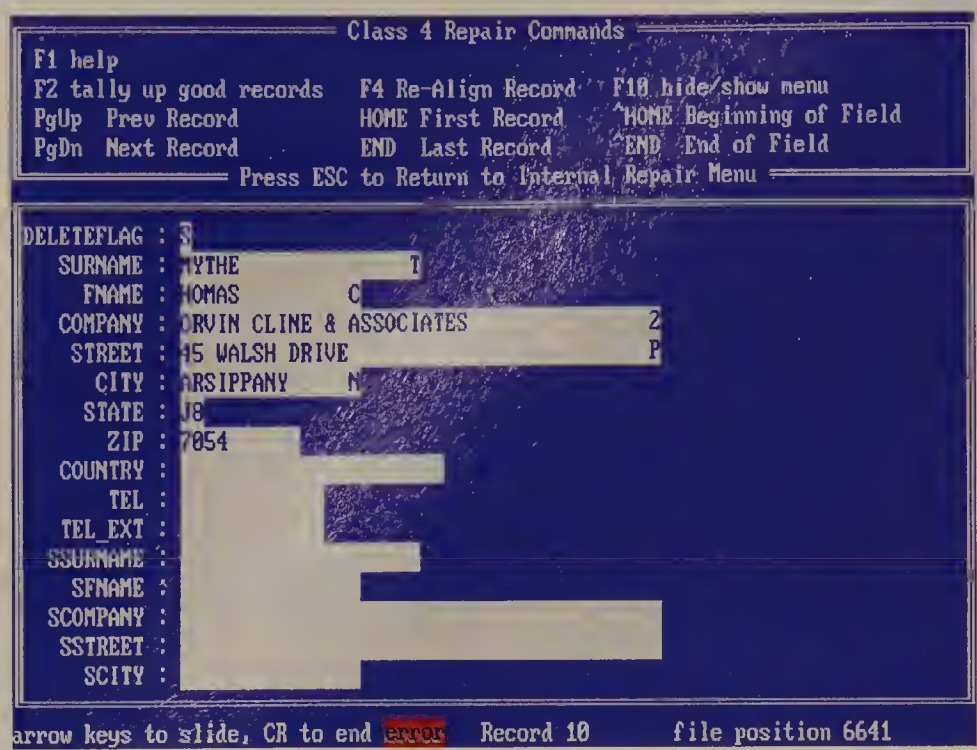

This dBASE record may look tortured, but dSalvage can realign the offset data with a single press of the arrow key.

Publishing, Ltd., Pittsford, New York, 1985). He's also the author of *dSalvage*, a lifesaving utility that automatically diagnoses and repairs damaged data files. *dSalvage* speedily recovers files suffering from damaged or missing headers (those vital sections that describe the file layout), garbage characters, displaced records, and even files accidentally obliterated by *dBASE*'s powerful Zap command. In fact *dSalvage* fixes everything except damaged .DBT memo files. Version 1.43 is compatible with *dBASE IV* files provided they don't have memo or floating-point fields, or more than 128 fields per record. If your lost *dBASE* data is still intact anywhere on disk, *dSalvage* can resurrect it.

Using *dSalvage* is simplicity itself. Even if you've never looked at *dSalvage* before the moment you desperately need it, you can analyze and diagnose a traumatized .DBF file with a single function key. When *dSalvage* detects one or more types of damage, simple instructions tell you how to fix things fast. And when using the utility, it pays to follow orders. If *dSalvage* tells you to press <Enter><F3><F5>, don't ask questions —just do it.

The *dSalvage* menu will satisfy most casual users, and the software and manual offer lots of technical help if you want to explore .DBF files at the byte level. *dSalvage* provides a header editor, record editor, and bytestream editor, which together allow manual editing of any .DBF file, regardless of its condition. On-line help is also available, along with a terrifying assortment of damaged practice files.

At press time, Heiser was set to release version 1.44, which he claims will be completely compatible with *dBASE IV*. He is also working on *dSalvage Professional*, a new $199.95 package that includes a powerful new sector editor, a hex editor, and a manual unzapper that lets users compare data across clusters when rebuilding large files with partly overwritten data.

dSalvage's user interface isn't particularly polished and its classification of damage types is quirky, but when your data shows up intact, all is forgiven. The package is like insurance; you buy it hoping you'll never have to use it. But if you ever do, *dSalvage* is definitely the right tool for the job.

—*Alan Schwartz*

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TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 9–6
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Reader service no. 695

Dennis Dykstra is a contributing editor for PC World *and a professor at Northern Arizona University in Flagstaff. Richard Jantz is a desktop publishing consultant and the author of* The Complete Scanner Handbook *(Peachpit Press, Berkeley, California, 1988). Steven Lord is a mechanical engineer and freelance writer in Tewksbury, Massachusetts. Scott D. Palmer is a senior editor for* Federal Computer Week *in Washington, D.C. Alan Schwartz is a data base programmer and analyst in San Francisco.* ●

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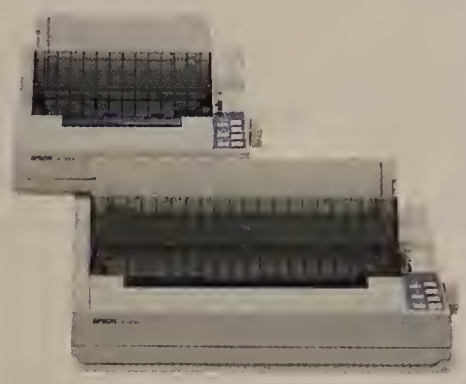

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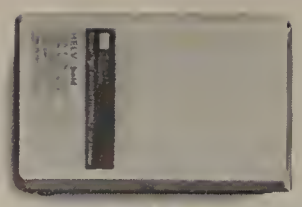

Most printer cartridges offer 4 type sizes.

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SPECIAL REPORT

WINDOWS

A PC World *Supplement on Windowing Environments and Applications*
Edited by Robert Luhn

WINDOWS MADE OVER

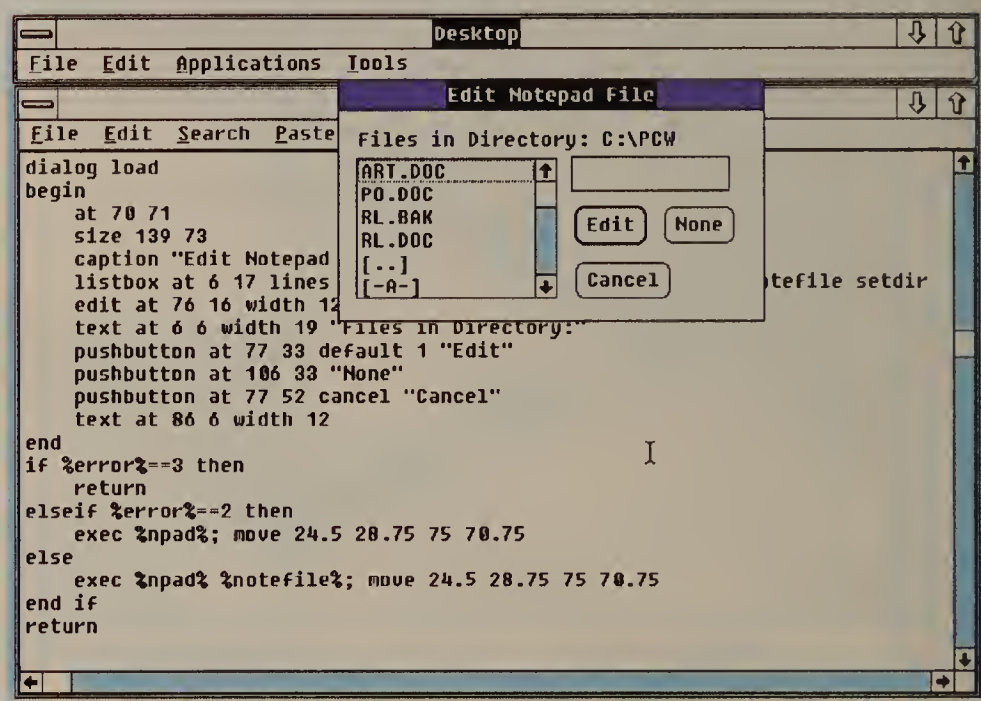
Third-party developers are reshaping and extending Windows—and converting corporate America to Windows in the process.

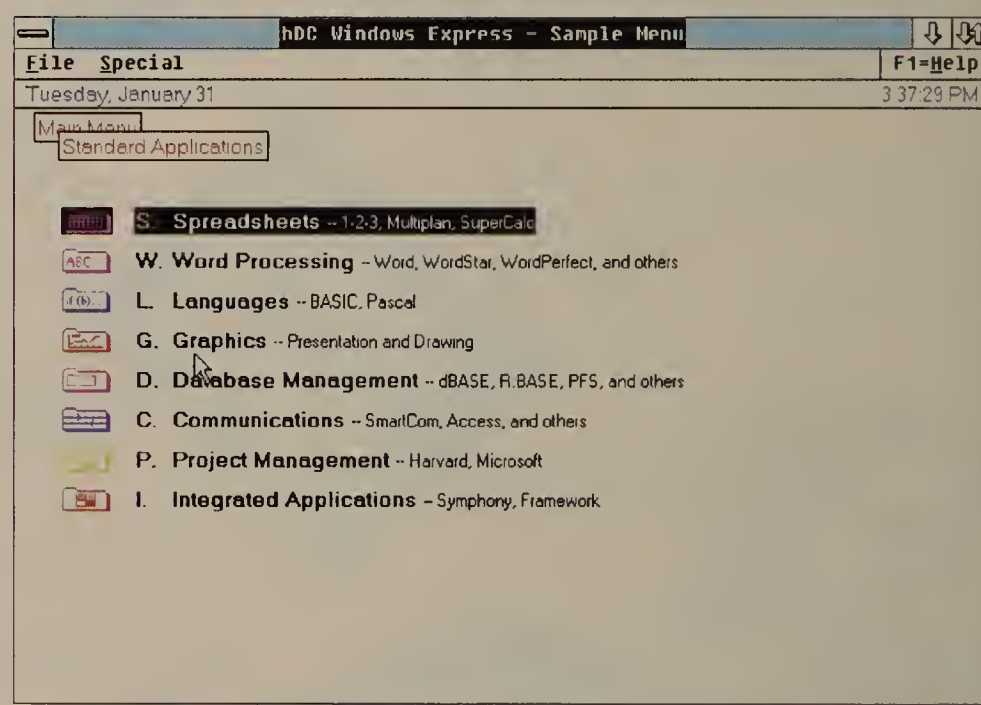
Judy Getts

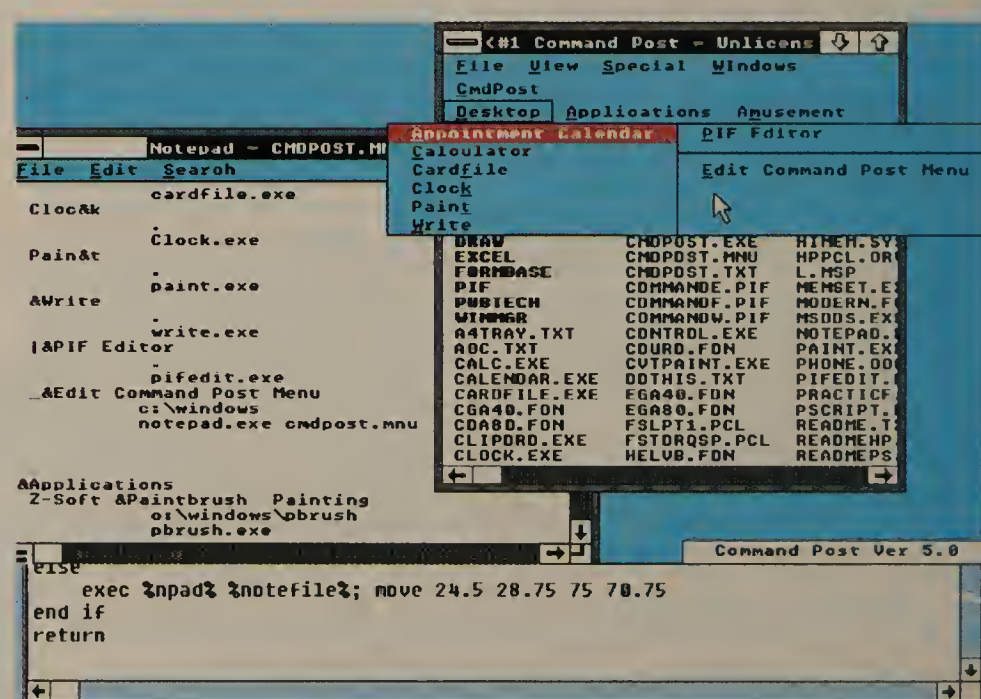
If you find *Windows'* opening MS-DOS Executive screen confusing, if you yearn for a few icons, or hope against hope for a full-fledged macro language that can mesh all your applications within the *Windows* environment, take heart. From tiny Wilson WindowWare to megacorp Hewlett-Packard, third-party developers are producing a raft of new tools that transform Microsoft's not-so-intuitive beast into one powerful pussycat.

Depending on your whim and budget, you can now add custom pulldown menus to *Windows*' opening Executive screen, endow *Windows* with more powerful icons and folders, or turn *Windows* into an object-oriented environment with the power to integrate and hot-link data from DOS and *Windows* applications. If you think *Windows* is confining—and hard to sell in your training-conscious company—think again.

Top to bottom: Bridge/386—macros and custom dialog boxes; Windows Express—icons for the Executive; Command Post—quick menus.







Curing the MS-DOS Executive Blues

Windows' functional limitations begin at the MS-DOS Executive, a glorified DIR listing that forces users to sift through subdirectories looking for the right executable file. If users aren't DOS savvy, training them can be problematic.

William Bailey, senior consulting engineer for E.I. du Pont, says the company's engineering department adopted *Command Post*, from Seattle-based Wilson WindowWare, to take the edge off the Executive. *Command Post* is a cheap shareware program that lets you add pulldown menus, tile or stack windows, and use a screen blanker.

"We like the product so much," says Bailey, "that when Microsoft showed us their latest version of *Excel*, we showed them *Command Post* and said, 'This is what *Windows* should do out of the box.'"

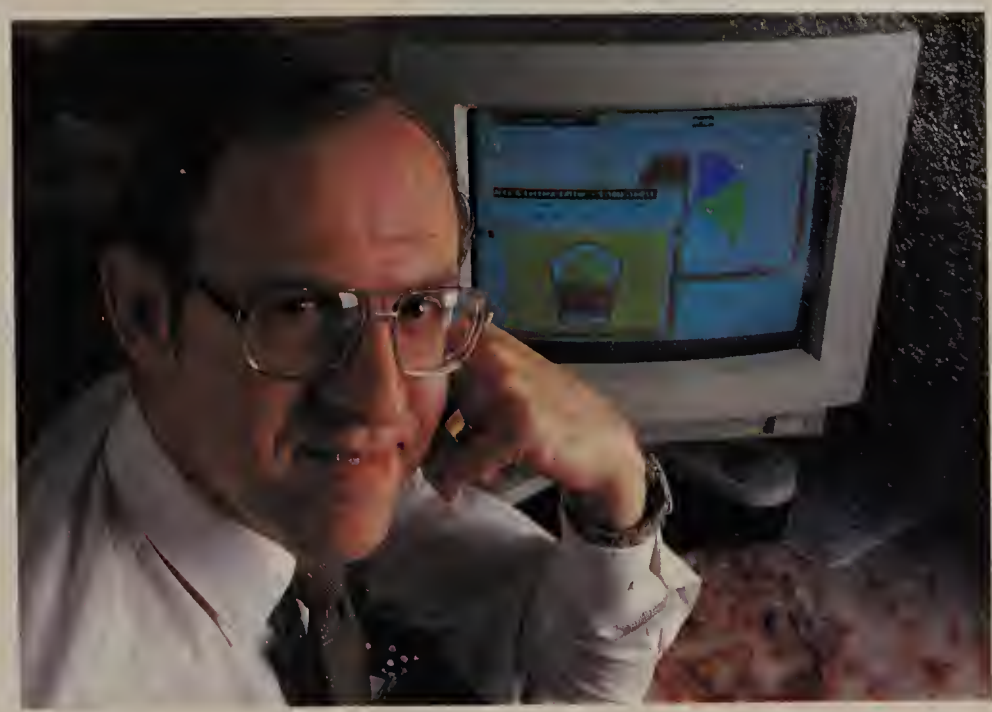
Windows cum Macintosh

If you need something more—say, full-screen menus, custom icons, folders that replace subdirectories, and other Mac-like aids—hDC's *Windows Express* tops the list (see the review in this section). Coca-Cola's 386-workstation users have given the program a solid thumbs-up. "Our users love the icon-driven front end," says Currid. "With *Windows Express* you can create icons and colorful

Depending on your whim and budget, you can now add custom pulldown menus to *Windows*' opening Executive screen, endow *Windows* with more powerful icons and folders, or turn *Windows* into an object-oriented environment with the power to integrate and hot-link data from DOS and *Windows* applications. If you think *Windows* is confining—and hard to sell in your training-conscious company—think again.

Adam Rostoker, executive director of the Windows Presentation Manager Association, calls such products crucial to the future of *Windows*. "*Windows* is a super operating environment for many things, but there's not a lot of functionality straight out of the box," says Rostoker. Cheryl Currid, manager of departmental computing services for Coca Cola Foods, concurs, noting that without add-ons, *Windows* won't fly in the corporate world. "These products make [*Windows*] work the way end users want it to work," says Currid.

menus that are several levels deep, and it literally takes 5 minutes to get users up and running." Another big plus: Company trainers can easily add custom help screens to any menu option. Not surprisingly, hDC recently inked a contract with Galileo, a European airline conglomerate, that will put *Windows Express* on an estimated 20,000 to 40,000 airline reservation PS/2s within the next two years.



"Users don't need computers—they need information," says Hanover Trust's Art Block.

Jonathan Levine

Beyond Batch Language

Perhaps the most exciting *Windows* tools are emerging in the field of application integration and development. The program of choice among many micro managers is *Bridge*, a super *Windows* batch language from Softbridge Microsystems of Cambridge, Massachusetts. *Bridge* not only lets in-house developers create job-specific user interfaces, it also enables *Windows* and DOS applications to swap messages and data on a single system or LAN.

Manufacturers Hanover Trust uses *Bridge* as the sinew for its futuristic network of 1000-plus 386 PCs—all running *Windows*. With *Bridge*, account executives need never know they are using *Excel*—they see only graphs and figures. Nor are they aware they're switching to a word processor when they click the 'Write a Memo' option on a menu. In short, changing applications is totally transparent. "Users don't need computers," says Art Block, vice president of end-user automation support at Hanover. "They need information. They need to write letters or do credit analysis. The most technical term on our menus is Exit."

Making NewWaves

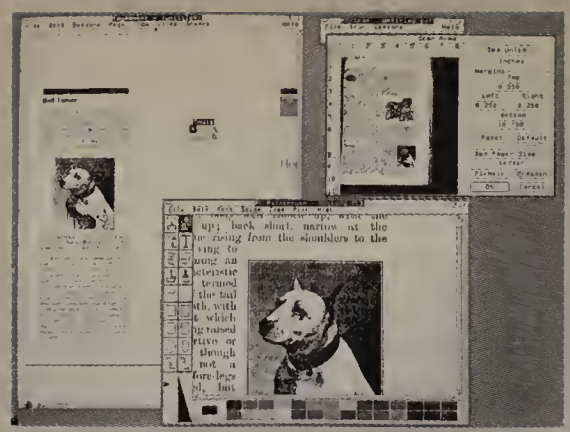
Meanwhile, Hanover and other corporate *Windows* enthusiasts eagerly await the arrival of Hewlett-Packard's *NewWave* object-oriented application development environment—and for good reason. With *NewWave*, you will be able to hot-link data between DOS and *Windows* applications on 80286 computers; automate complex environment-wide tasks with a powerful macro language; and even create interactive, on-line training programs.

NewWave's secret lies in treating elements—charts, text, worksheets—as discrete objects and keeping track of where they're stored and what source applications created them. With this system, you could easily build a document that incorporates customer addresses from *dBASE IV*, accounts receivable numbers from *Excel*, and a company logo from *PageMaker*. To update the document, you'd simply click the numbers (to load *Excel* and the appropriate worksheet) and change the data. You can link data in any number of files by copying the object's icon wherever you want. The implications for both stand-alone and work-group computing are tremendous. American Airlines was so impressed with *NewWave* that it plans on making the program the centerpiece of an integrated office system that links the company's wide area network to 14,000 American employees worldwide.

Unfortunately, *NewWave* requires hefty amounts of disk space and RAM. And though business users are enthusiastic, developers are a bit leery. Crafting applications for *Windows* is tough enough; modeling them to take full advantage of *NewWave*'s talents requires more time and money than many companies can spare. Paul Grayson, president of Micrografx, has admiring words for *NewWave* but bluntly notes, "*NewWave* applications are at the bottom of our list. *Windows*, Presentation Manager, and Mac applications come first."

HP plans to ship *NewWave* by the end of 1989, and nearly a dozen vendors have pledged to support it—including Microsoft, with a *NewWave* version of *Excel*. Other developers, however, remain skeptical about whether HP has the marketing clout to make the environment take off. No matter. According to sources at Microsoft, future versions of *Windows* will undoubtedly incorporate *NewWave* concepts. In the meantime, users will be flocking to other add-ons that finally transform *Windows* into a helpmate *and* a multitaskmaster. ●

Judy Getts is a contributing editor for PC World.



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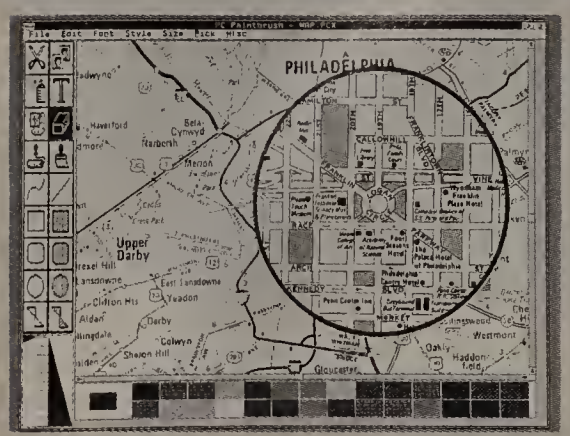

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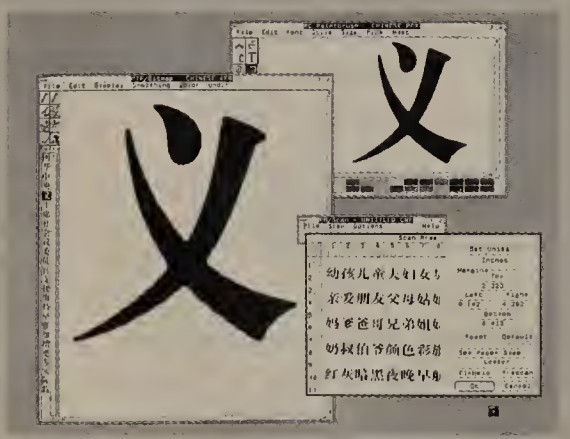

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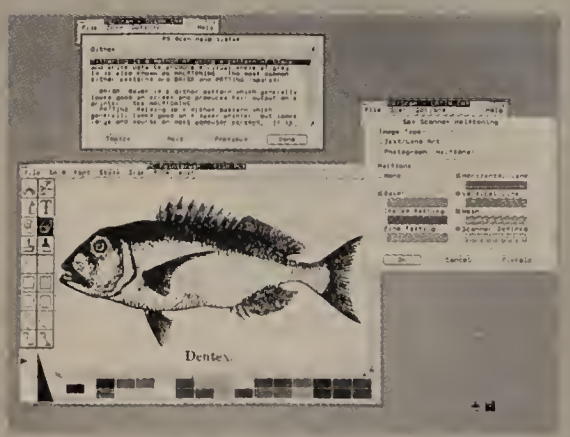

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Facsimile: 404/427-1150
Telex: 6502859318

Circle 206 on reader service card

Ami 1.0

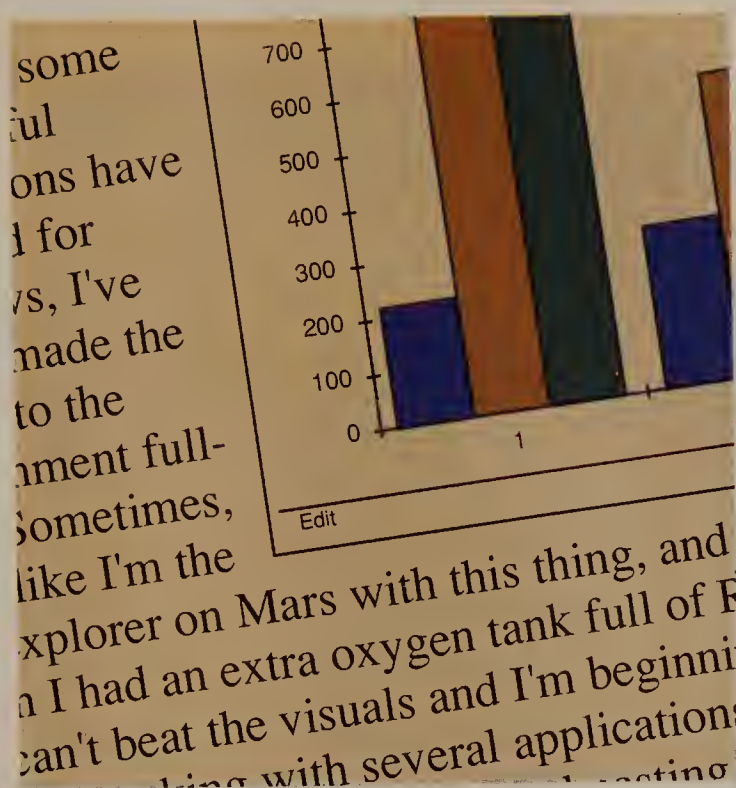
Word processor

PROS: Easy to use, style sheets, page preview, numerous shortcuts, useful page layout tools

CONS: Lacks advanced text-processing functions, limited file importing, slow backward scrolling

Until the ultimate *Windows* word processor comes along, a friendly, albeit limited, alternative is at hand: *Ami*. Samna Corporation's first *Windows* entry won't beat *WordPerfect* or *PageMaker* at their respective games. But for $199 you get a lean, clean, intelligently designed word processor that's ideal for letters, memos, brief reports, newsletters, and other short projects that need to incorporate graphics and fonts.

Compared to NBI's *Legend*, a bulky, slow word processor cum desktop publisher, *Ami* is positively sprightly, thanks to a speedy character-only draft mode dedicated to text entry and editing. When you're ready to insert graphics, flow text into multiple columns, or perform other desktop publishing tasks, you merely click an icon to flip into the slower graphics-oriented layout mode.



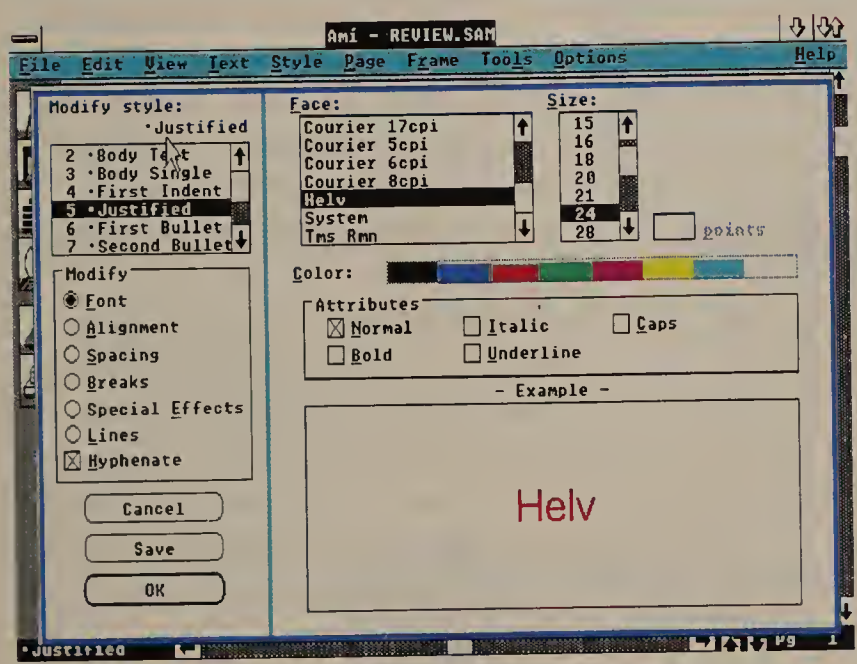
AMI 1.0
Using Ami, you can flow text around, above, below, or through a graphic element.

Like many desktop publishing programs, *Ami* holds graphics and special text items (such as captions and headlines that stretch across several columns) in *Ventura*-like frames that can be sized, moved, and stacked. Creating a frame is straightforward: Click an icon, hold the mouse button, and pull to stretch out the frame's boundaries, then pour an image or text file into the frame. By default, body text automatically flows around a frame, but you can also flow it above, below, or even through a frame.

If the thought of formatting a document chills you, chill out—*Ami* comes with 25 *Ventura*-like style sheets that control margins, columns, line spacing, fonts, type size, and more. Merely highlight the text, click a style (such as 'Centered Headline') listed in an on-screen box, and the text is transformed. Of course you can format text on the fly with keyboard shortcuts, but if you work via the menus and style sheets, *Ami* displays a dynamically changing sample of the text in a special window—a feature that saves time when sculpting a document's look. A static page-preview function is also available.

If you've used *Windows Write*, *Ami*'s draft mode will seem familiar, although you'll find some notable improvements. Text is more readable, and scrolling and paging are a little peppier. (Moving from the bottom of a long document to the top, however, can slow *Ami* to a crawl.) The interface is also efficiently designed. Click one of the icons lining the left side of the screen, and you can instantly change views, create frames, modify styles, print, and so on. The program also offers innumerable <Ctrl>-*key* shortcuts for aligning and enhancing text and selecting important functions.

Just remember that *Ami* is no substitute for a full-fledged word processor. It offers cut and paste, search and replace, various page views, and a 130,000-word spelling checker. But that's about it. It lacks multiple document windows, mail merge functions, a footnoting capability, a table generator, a thesaurus, macros, and index and table of contents generation. Editing is also a drag, because the easiest approach means issuing <Ctrl>- and <Shift>-*key* combinations to perform such basic functions as move and copy.



Ami makes formatting a breeze by displaying changes in an on-screen box.

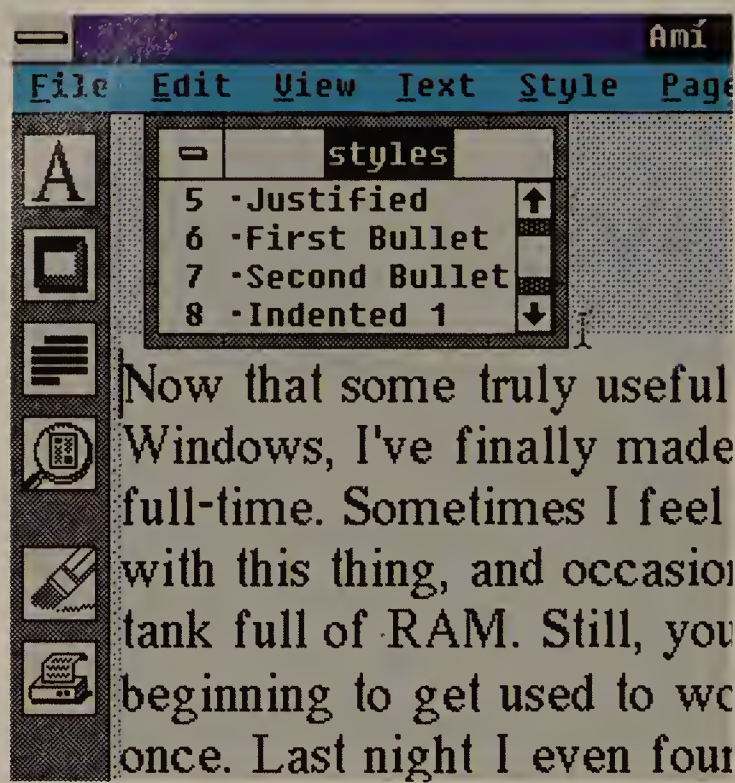
Those searching for heavy-duty desktop publishing prowess should also look elsewhere. *Ami* is missing kerning, tracking, and similar typographic controls, along with any kind of drawing tools for creating simple graphics or touching up imported ones.

Given *Ami*'s limits, you'd probably use your powerful stand-alone word processor for most work and import your creation into *Ami* for last-minute editing, layout, and formatting. Unfortunately, *Ami* will only import (and maintain formatting for) ASCII, *Samna Word*, *WordPerfect 5.0*, *WordStar 2000*, and *AdvanceWrite* text files; graphics files are limited to TIF and .PCX formats. *Ami* also has the annoying habit of mistaking hard hyphens for soft ones if they appear at the end of a line in an ASCII file. Samna pledges to provide registered users with free filters for *Microsoft Word* and most versions of *WordStar* in the near future.

Still, *Ami* is one of the best word processors currently available to *Windows* users. If you want to create more complex documents and have macros, mail merge, automatic table generation, and more at your disposal, wait for the mid-1989 release of *Ami Professional*. It may just give *WordPerfect*, *Word*—and Microsoft's rumored *Windows*-based word processor—some real competition.
—*Patrick Marshall*

WHERE TO BUY

Ami 1.0
Somno Corp.
5600 Glenridge Dr.
Atlonto, GA 30342
800/831-9679, 404/851-0007
LIST PRICE: $199 (includes run-time version of Windows/286)
REQUIREMENTS: 640K; DOS 3.0 or loter version; 80286 or 80386 system; Hercules, EGA, or VGA odopter; 1.2MB or 720K 3½-inch floppy disk drive (360K disks ovoiloble by request); hord disk; Windows 2.0 or loter version recommended
Not copy protected
TECHNICAL SUPPORT: unlimited phone support, no toll-free number, M–F 8–8
OTHER SUPPORT SERVICES: The Source BBS
Reader service no. 800



AMI 1.0
Ami's icon bar makes it simple to change text styles, create graphics frames, and print documents.

Xerox Presents 1.0

Presentation graphics program

PROS: Generotes shorp output for overheods ond slides, superb drow module ond color support, includes Fontwore, imports numerous file types, slide-show feoture

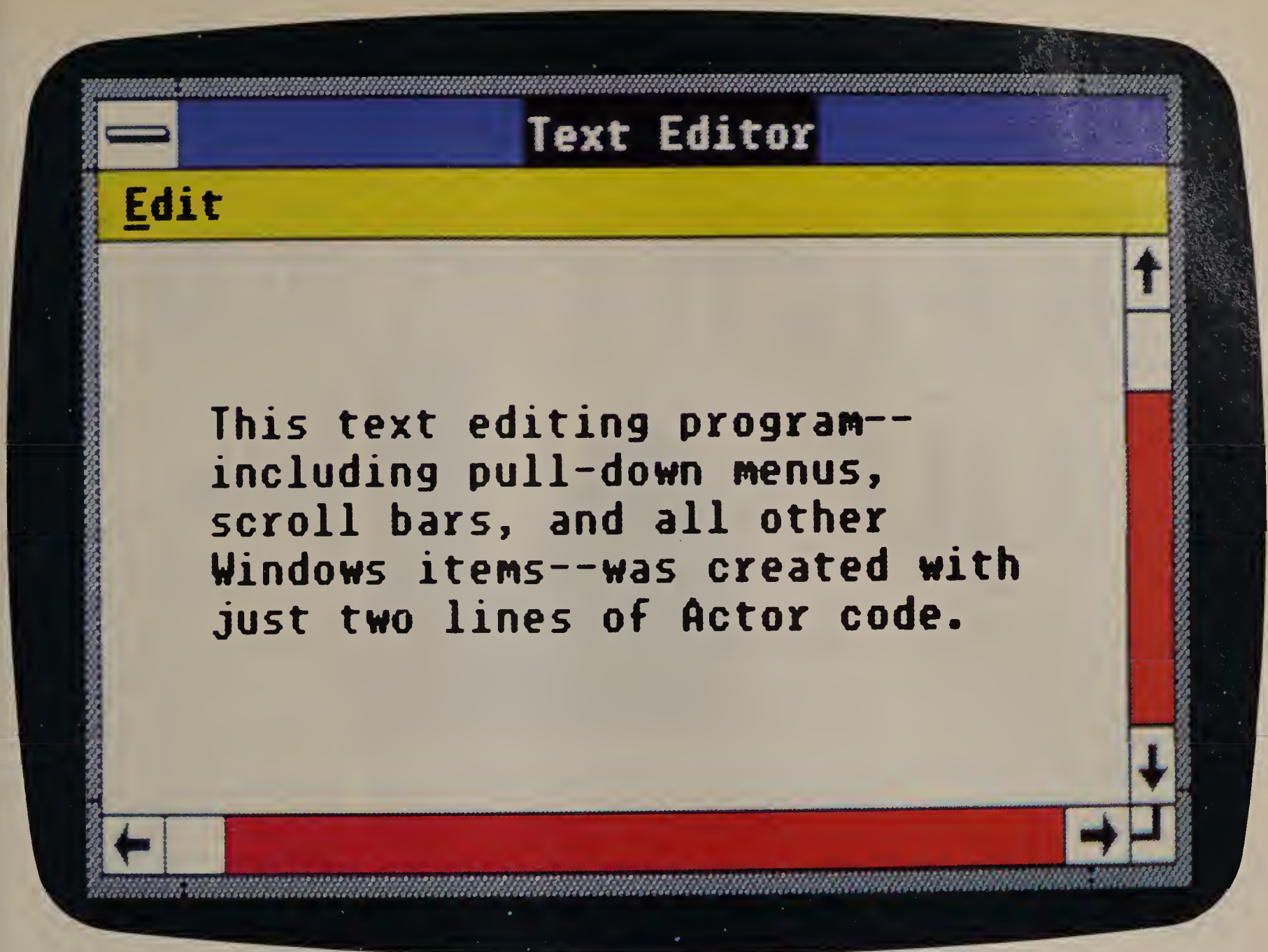
CONS: Extremely slow, poor plotter support, limited file export

Graphics literates who regularly give presentations with overhead transparencies or 35mm slides will welcome *Xerox Presents*. This hand-holding program not only matches *Harvard Graphics* and *35mm Express* when it comes to generating great-looking output (see "Business Graphics Roundup," *PCW*, July 1988) but also can simultaneously produce speaker notes and audience handouts. If the PC is your projector, *Xerox Presents* will even display images unattended in slide-show fashion and toss in "wipes," "fades," and other special effects.

Crafting a presentation image is a matter of flipping open menus and following the prompts. You load one of many supplied style sheets (complete with dummy text and graphics that you merely replace), type in vertically or horizontally aligned text, and import graphics or create your own with *Xerox Presents*' capable drawing tools. Every item is treated as a separate object, so you can easily forge compound images and resize and overlap them on a *PageMaker*-like snap-to grid. The program supplies 256 colors and patterns to dress up your images.

Building a table is similarly simple: You specify size, number of rows and columns, justification, and fonts in an on-screen form, then type in the data, directly import a .WKS file, or shovel data in with the Clipboard. To graph the data, however, you must copy it to another module with the Clipboard. Once there, eight different graphs (some in 3-D) can be produced, and you can spruce up the image with some of the best clip art around.

Xerox Presents also wins high marks for readily accepting ASCII, DIF, .WKS, .CGM, .PCX, SYLK, TIF,



Actor™ is the fastest, easiest way to develop applications for Microsoft® Windows. The reason—Actor's reusable toolkit of objects such as dialog boxes and edit windows. It more than doubles your overall productivity, making Actor an essential part of any Windows development project.

A full-featured, interactive, Windows-based programming environment, Actor provides immediate compilation, interactive testing, and source-code debugging. You can use it to produce fast standalone applications that support all Windows features, including Dynamic Data Exchange (DDE) and expanded memory.

Actor is a powerful, pure object-oriented programming language. It's all you need to develop complete Windows applications. You also have the option to dynamically link Microsoft C code to your Actor program.

Either way, it's the fastest way to produce everything from prototypes to complete development projects. No wonder so many developers are already using Actor.

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The sooner you do, the sooner you can speed up *your* Windows development work.

These two lines of Actor code are all it took to produce the Windows text editing program you see above. Just think what you can do with a few more lines.

Find out about Actor.
The Whitewater Group, (312) 491-2370

Technology Innovation Center
906 University Place, Evanston, IL 60201

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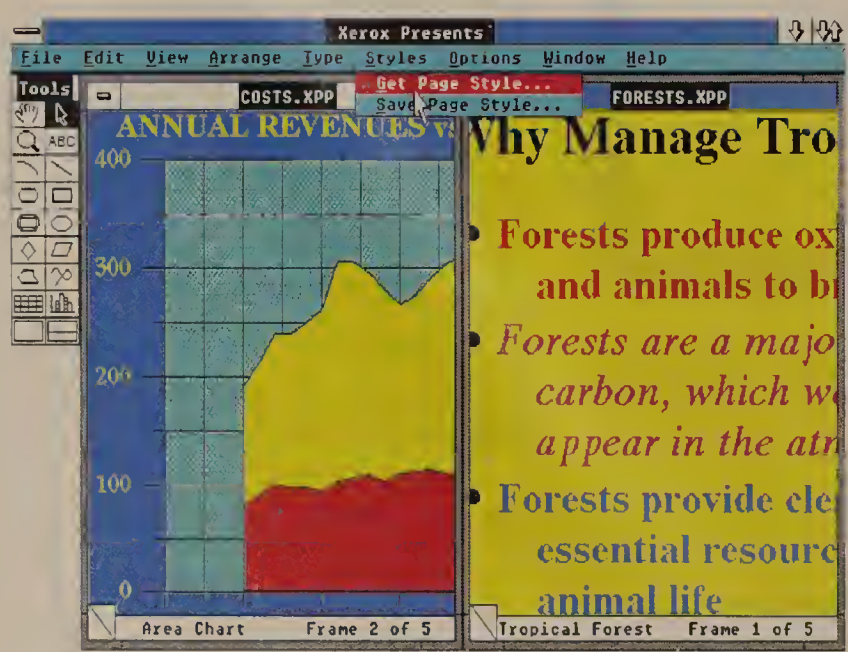
Windows metafile, encapsulated PostScript, and *Windows Paint* files. Unfortunately, it exports files only via the *Windows* Clipboard or in metafile format. The package also lacks enhanced plotter support, relying instead on *Windows'* crude plotter fonts, which are hardly acceptable for business presentations. Finally, *Xerox Presents* is a slugabed. On anything less than a 16-MHz 386 machine, redrawing the screen (which occurs whenever you make a minor change) takes forever. Another thumb twiddler: printing an image that uses *Fontware*-generated fonts.

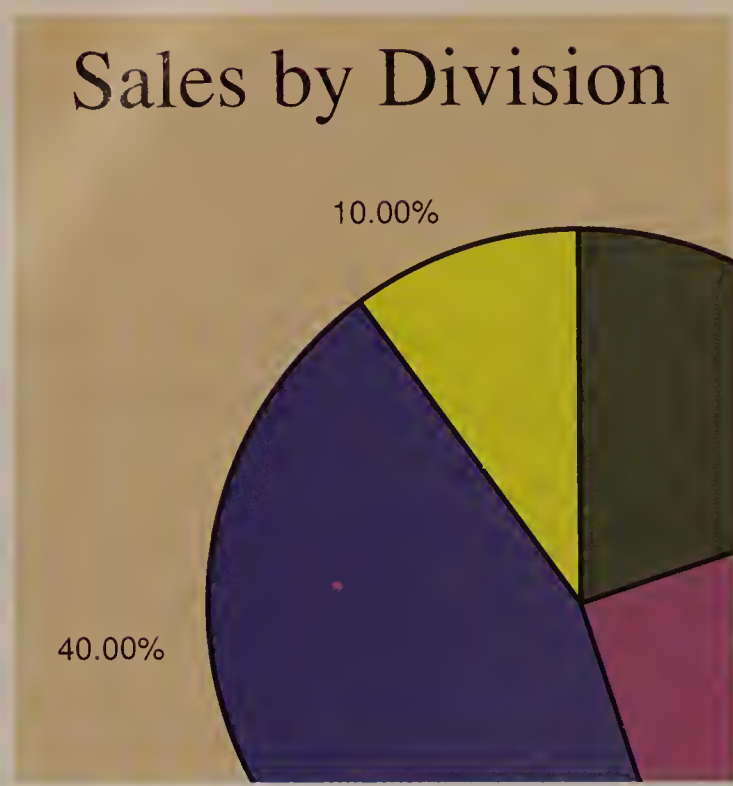
These aren't flaws to be taken lightly, but on balance *Xerox Presents* merits consideration. If creating visual presentations is a regular part of your job, this is the most capable program around. —*Dennis Dykstra*

WHERE TO BUY

Xerox Presents 1.0
Xerox Software Marketing Services
P.O. Box 660512
Dallas, TX 75266-0512
800/822-8221
LIST PRICE: $495
REQUIREMENTS: 640K (1MB recommended); hard disk; 80286 processor (80386 recommended); DOS 3.1 or later version; VGA, EGA, or Hercules Graphics Card
Not copy protected
TECHNICAL SUPPORT: 60 days free, M–F 8–6; annual extended support including toll-free number $100 (single user), $1000 (multiple users)
OTHER SUPPORT SERVICES: one-day training workshops
Reader service no. 801



Xerox Presents lets users view multiple images simultaneously in separate, tiled windows. Data can be shown full size, or it can be redrawn to fit the window.



XEROX PRESENTS 1.0
Xerox Presents offers a superb draw module and complete graphing capabilities for exciting desktop presentations.

Windows Express 2.1

Windows front end

PROS: Replaces the MS-DOS Executive with custom menus and icons; unlimited number of submenus; lucid user manuals

CONS: Menu construction can be tedious

For many users, the toughest part of learning *Windows* is figuring out how to run a program from the MS-DOS Executive. If you agree that double-clicking on an executable file name is pretty archaic—or if you need to simplify *Windows* operations for office users—you're a candidate for hDC's *Windows Express*.

An upgrade to the company's *ClickStart*, *Windows Express* lets you mask *Windows'* less-than-friendly opening screen with a custom full-screen hierarchical menu system complete with icons and help windows. The menu system revolves around "folders" that group together common applications. For example, a folder might contain *Pixie*, *Designer*, and *Windows Graph*. Click this folder's icon, and up pops a submenu listing the applications; click the icon for an application, and it runs. Since folders can hold other folders, there is no limit to the complexity of the menus.

You build menus by filling out a simple on-screen form for each menu item. To add *Word* to a menu, for example, you'd supply the program name, the location of the executable file, loading parameters (such as /K), an <Alt>-*key* alternative for nonmouse users, and a password. You can even direct *Windows Express* to display a list of data files by extension every time *Word* runs. Select one of the fifty icons provided—or modify one, pixel by pixel, with a supplied icon editor—and you're done. You can tie a custom help screen to a menu option along the way by clicking an icon in the form and entering your on-line caveats in a pop-up text box.

Look great without a lot of makeup.

Transforming a blank piece of paper into a document that's as appealing as this calls for plenty of page makeup.

But if you're like the rest of the world, you've barely got enough time to write, let alone struggle with formatting.

Well, now you don't have to. Because Amí is here. And it's about time.

Amí can save you about three quarters of the time you're currently spending on everything from simple letters and memos to presentations, reports and newsletters.

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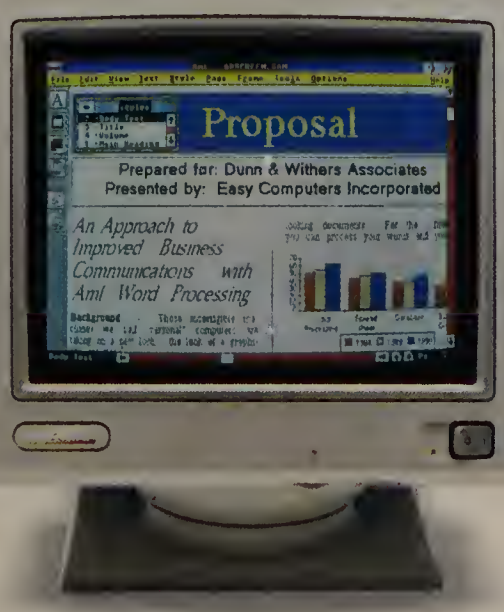

By letting you write your words and make up your pages *at the same time.*

In fact, you don't have to do any makeup at all.

Because Amí gives you over two dozen pre-designed style sheets that let you instantaneously transform plain words into gorgeous documents.

Amí looks a lot like a desktop publisher. And the documents you can create with it have desktop publishing written all over them.

But as you'll quickly discover, Amí is a serious word processor that makes the most of Microsoft® Windows.

(If you don't have Windows, don't worry. A runtime version is included.)

You can integrate text and graphics. Import both from other programs. And admire your documents from four fully editible page views.

Right now, we suggest you admire the $199 price tag and send in this coupon right away.

Or just pick up the phone and call us at 1-800-831-9679.

Then you can take advantage of our 30-day money back guarantee.

Now that should help you make up your mind.

"A fast personal word processor... that makes it easier to produce great-looking reports, letters and memos than any other PC word processor."
PC/Computing

"Surprisingly sophisticated... quite simple to learn and use ...among the most powerful of the executive word processors."
Michael J. Miller, in InfoWorld

"Makes desktop publishing class output a snap for the average user."
William Zachmann, in PC Week

SAMNA

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City/State/Zip _____

Phone _____

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Card No. _____ Exp. _____

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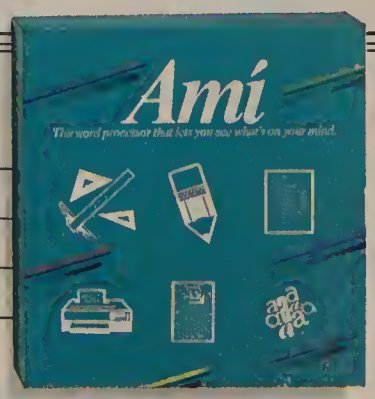
Add $10 for shipping & handling (GA residents add sales tax). Prices valid in U.S. only.

CALL 1-800-831-9679 FOR YOUR NEAREST DEALER. PCW



Requires IBM® AT, PS/2 or compatible (80286 or '386 CPU); CGA, EGA, VGA, or Hercules compatible displays; MS/DOS 3.0 or higher.

Amí is a trademark of Samna Corporation. All other trademarks and copyrights are acknowledged.

Circle 220 on reader service card

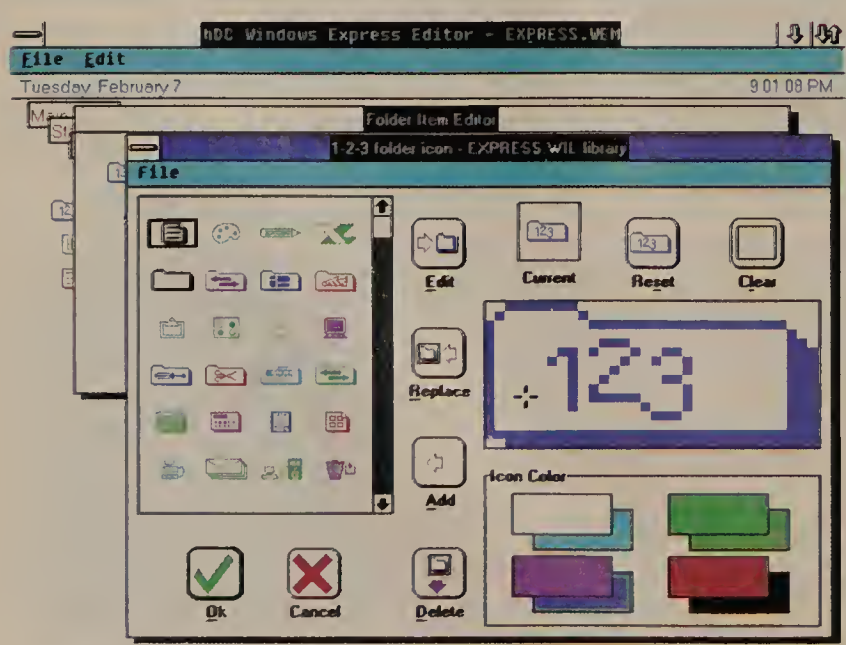
Users will be able to display the help screen by clicking the menu option and pressing <Ctrl>-<Shift>.

Constructing menus is simple enough, but designing and testing a menu system that lists a dozen programs can take an hour, because you must fill out a form for every single item. With the *Norton Commander*, you merely create a single text file that lists all menu options and the commands they trigger—an approach *Windows Express* would do well to emulate. hDC should also consider beefing up security. Although *Windows Express* offers password protection for folders, programs, and even itself, you can easily defeat the system if you know how to start *Windows* without *Windows Express*.

Finally, you might ask yourself if *Windows Express* is worth $80. The program doesn't endow *Windows* with a macro language or even allow you to automate window placement—powers that will be available in hDC's *Windows Manager* later this year. If all you need is custom menus, consider *Command Post*, a shareware program from Seattle-based Wilson WindowWare that provides the menuing functionality (minus the flashy icons) of *Windows Express*. It's simpler to use—and it's only $20. —*John Walkenbach*

Matthew Nielsen

WINDOWS EXPRESS 2.1
Store your correspondence in a customized Windows Express folder with icons of your own making.



Creating icons in Windows Express is a fill-in-the-forms, point-and-shoot job.

WHERE TO BUY

Windows Express 2.1
hDC
15379 N.E. 90th St.
Redmond, WA 98052
206/885-5550
LIST PRICE: $79.95, upgrade from ClickStart $20 (free if purchased after June 1, 1988)
REQUIREMENTS: Microsoft Windows 2.0 or later version
Not copy protected
TECHNICAL SUPPORT: free for 90 days from first call, no toll-free number, M–F 8–5
OTHER SUPPORT SERVICES: none
Reader service no. 802

Adobe Illustrator

Draw program

PROS: Precise manipulation of curves, objects, and type; auto-tracing and freehand tracing functions; PostScript special effects

CONS: Extremely slow, hard to learn, limited file import, PostScript printer required for most output, no color preview or separations

When Adobe introduced *Illustrator* for the Macintosh in 1987, thousands of frustrated artists were set free. At last a package had arrived that made professional-quality microcomputer-based illustration a reality. *Illustrator* for the PC won't make quite the same splash—it doesn't match the powers of the latest Mac version, it's incredibly slow, and in the business-oriented PC market, *Micrografx Designer* dominates. But professional illustrators and serious desktop publishers who produce logos, artistic renderings, and technical drawings will find the package alluring.

Illustrator's strength is its ability to control Bezier curves. Using an on-screen pen, you draw connected lines and curves that form the outline of an image, then grab the outline at various spots to precisely adjust the final shape. The technique takes some getting used to, but it's remarkably effective.

Because *Illustrator* treats all elements like objects, you can scale, skew, stack, and rotate curves, boxes, graphics,

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Seiko Instruments

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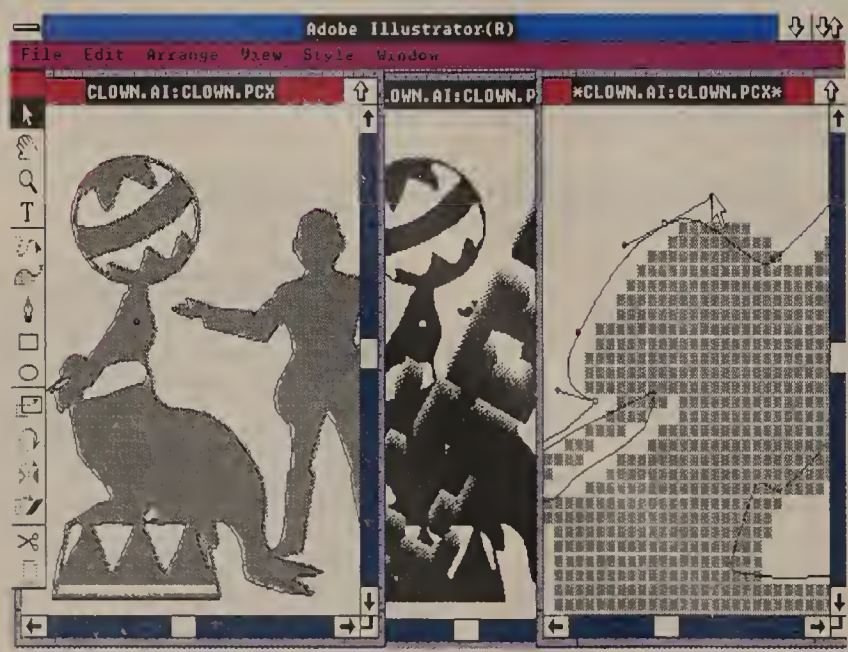
Circle 242 on reader service card

and text. If perspective drawings, fancy typography, and airbrush-like special effects are your meat, *Illustrator* is the best choice.

Artists grappling with detailed technical drawings will especially appreciate the program's tracing functions. Import a piece of clip art, a scanned image, or a *Paintbrush* graphic as a template, and *Illustrator* will adroitly trace it and create a curve-based image that you can endlessly manipulate. If you convert a .DXF CAD file with a supplied utility, the file will automatically be turned into an *Illustrator* object. (The original bitmapped images, however, cannot be edited or printed.) The startlingly sharp result can be printed out on any PostScript device or saved as an EPS file and used by *PageMaker*, *Ventura Publisher*, and other page layout programs.

Just keep in mind that *Illustrator* is not for casual users. Although you get some basic symbols, borders, and letterforms, the program itself generates only ovals and boxes—whipping up a pie chart would be pretty tricky. And tapping *Illustrator*'s special effects and high-resolution output requires a pricey PostScript printer.



In the right window, Illustrator's auto-trace tool has etched a path around a scanned image, creating a template. The center window shows a preview of the trace.

Matthew Nielsen

ADOBE ILLUSTRATOR

Illustrator for the PC has one great strength: the ability to control Bezier curves.

Artists should also note that the PC version can't do complex masking with multiple objects and lacks a "blend" tool to smooth transitions between different shapes and colors. You can specify gray percentages and CMYK color values, but *Illustrator* can't generate four-color separations or even preview an illustration in color.

Illustrator is also unbelievably slow. Switching from edit to preview mode on a 6-MHz AT can take several minutes, and cutting and pasting an image can easily top 30 seconds. Serious users interested in preserving their sanity will quickly opt for an 80386 system with gobs of expanded memory.

If you've got the hardware, the time, and the need, *Illustrator* is the best tool of its kind. Otherwise, seek out simpler draw programs. —*Steve Roth*

WHERE TO BUY

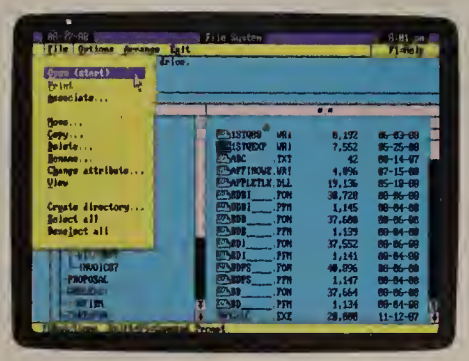
Adobe Illustrator
Adobe Systems, Inc.
1585 Charleston Rd.
P.O. Box 7900
Mountain View, CA 94039-7900
415/962-2000
LIST PRICE: $695
REQUIREMENTS: DOS 3.1 or later version; Windows 2.03 or later version; 640K RAM, 256K of expanded memory; 80286 or faster machine; EGA, VGA, or Hercules display; mouse or pointing device
Not copy protected
TECHNICAL SUPPORT: unlimited, toll-free number, M–F 8–4
OTHER SUPPORT SERVICES: free updates for 90 days, CompuServe forum, newsletter
Reader service no. 803

Patrick Marshall is a writer for Congressional Quarterly's *Editorial Research Reports. Dennis Dykstra is a contributing editor for* PC World *and a professor at Northern Arizona University in Flagstaff. John Walkenbach manages the consumer research department of a leading savings and loan association based in Southern California. Steve Roth is a Seattle-based freelancer and editor of* Real World PostScript *(Addison-Wesley, 1988).* ●

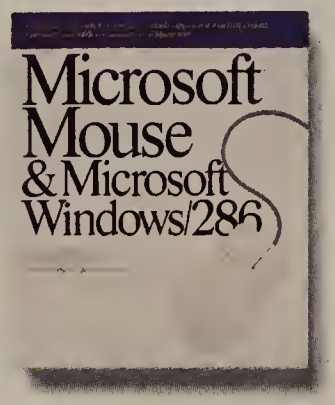
Push your software to the limit.

If you want to get the most out of today's new, high-powered software applications, we have a few words of advice:

Use a Microsoft® Mouse.



The Microsoft Mouse gives you easy access to all the powerful features today's software has to offer.



It looks innocent enough here, but wait until you see how the Mouse makes your software scream.

The Mouse can unleash your software—and take full advantage of the features intended to make your work easier.

With the Mouse you can effortlessly manipulate menu-driven applications without taking your eyes off your screen. You can pull down menus. Highlight text in one fell swoop. Copy, cut and paste formulas in spreadsheets easily. And move things from here to there without any command-key mumbo jumbo.

Literally hundreds of applications support the Mouse. But as the leading software developer for personal computers (and one of the first to bring a graphical interface to PC screens), we've gone a step further: Microsoft Windows/286 with PC Paintbrush® for Windows, Microsoft Paintbrush or EasyCAD™2 actually come with the Mouse (or vice versa).

Already, the Microsoft Mouse has made its way into the hands of over one million personal computer users. And that number is sure to grow even faster. After all, graphically oriented software is the driving force behind improved productivity.

But it's the Microsoft Mouse that puts you in the driver's seat.

Microsoft®
Making it all make sense.™

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Speed, **ease-of-use**, and **visibility** are the most important design aspects of ClickArt Scrapbook+. By automatically creating miniature copies of images in a file, Scrapbook+ allows a user to quickly scan a visual index of the entire file.

Users can also attach a series of keywords to an image. The **description line** is the basis for keyword searches performed by the **Find** function, allowing for a lightning fast way of retrieving images by name.

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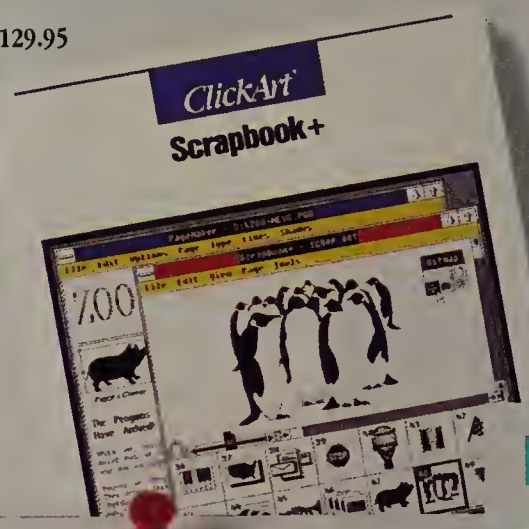
Scrapbook+ contains many more time-saving features, such as **ScreenCapture** and **Auto-Paste**, making Scrapbook+ an invaluable tool for all of your Windows work.

$129.95



"We can't overestimate the importance of this product...."
Boston Computer Currents
Tony Bove and Cheryl Rhodes

"... an essential addition to the Windows environment."
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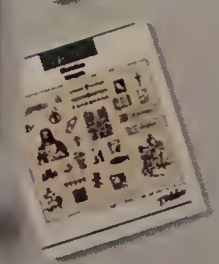

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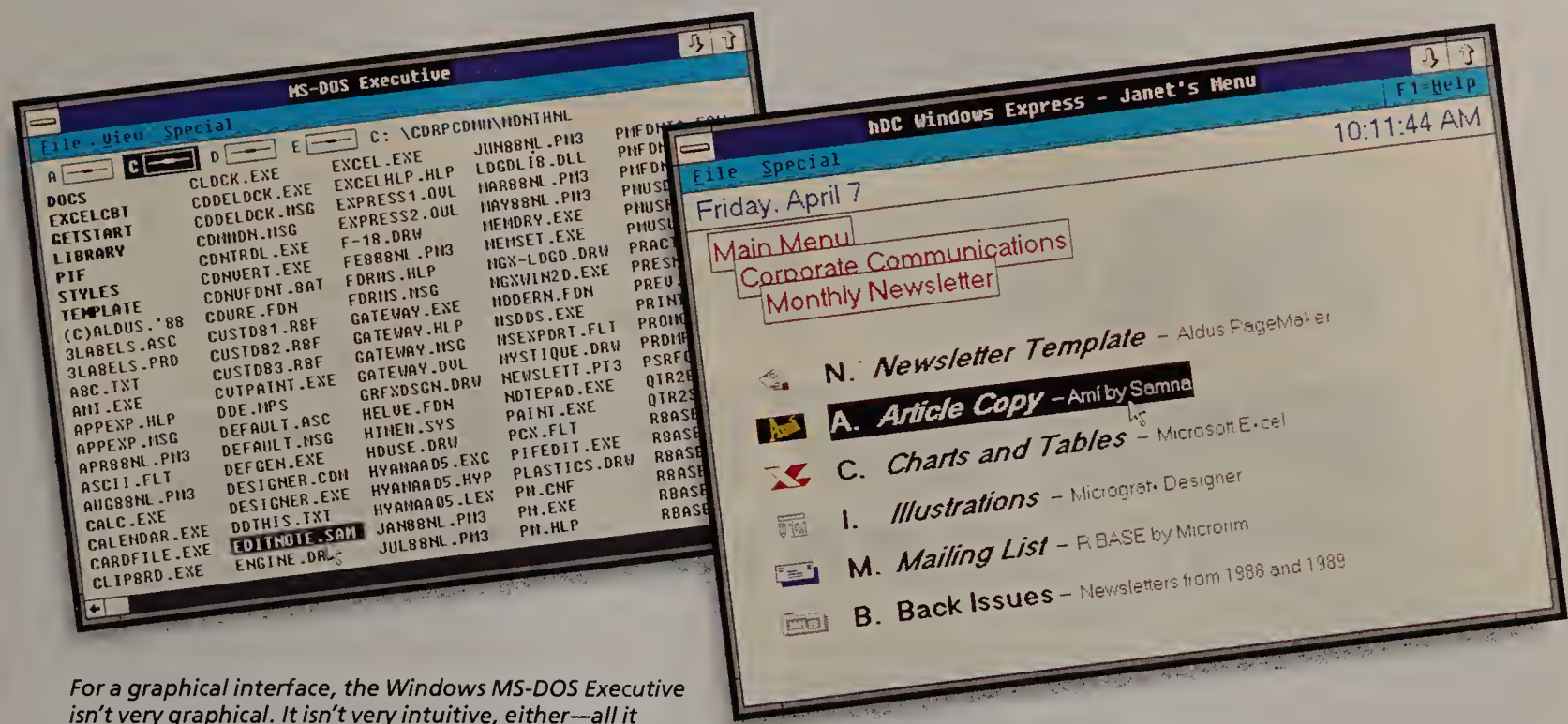
Circle 265 on reader service card

Clean Up Your Windows



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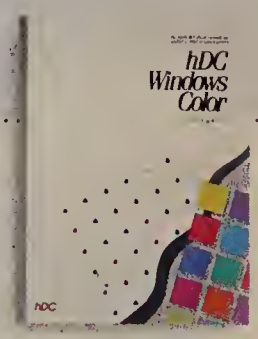

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MORE POWER TO YOUR PRINTER

Printers are essential to every PC-equipped office—so why aren't they easier to use? Here's a Buyers' Guide to tools that help you get the most out of your printer.

Matt Lake and Wes Nihei

Anyone who's tried to turn a file into hard copy knows that the interface between PC and printer leaves a lot to be desired. To help you overcome some of the most galling printer problems—delays, tricky interfaces, poor output—we've rounded up a passel of useful products in five key categories. Intelligent buffers and spoolers reduce the considerable delay between issuing the print command and regaining control of your PC. Printer control utilities allow you to bypass arcane control codes and take advantage of your printer's hidden talents. Font management utilities make it easy to mix and match resident fonts, cartridge fonts, and downloadable soft fonts. Finally, there's a grab bag of device emulators to help enhance the appearance of your output.

INTELLIGENT BUFFERS

If you do a lot of printing, you know how a backlog of print jobs can tie up your machine. A printer buffer will give you the extra RAM to set your PC free. Most buffers provide a minimum of 64K, but some can accommodate up to 4MB for big print jobs.

Buffers costing less than $75 are usually sequential: Files are printed in the order received, and the user has little or no control over the process. However, the *intelligent* buffers listed in **TABLE 1** provide much more control. Most interpret embedded print commands and include management utilities that let you alter the priority of print jobs, produce multiple copies, and direct data to different printers.

Almost all the buffers listed are stand-alone boxes. Only three (SimpLAN, ShareSpool, and Laserspool) are add-in boards that fit in the LaserJet's optional I/O slot. Just one product, MegaPrint, fits directly into a PC's expansion slot.

Most buffers provide several ports for input and output and support a variety of PC, printer, and port combinations. Options to consider include upgradable memory and daisy-chaining (which lets you connect several buffers).

SPOOLERS

For a less expensive alternative to buffers, try a spooler (see **TABLE 2**). Spoolers line up print jobs in a queue, either on a hard disk or in RAM. RAM spooling is fast, but RAM is expensive, and print jobs larger than the buffer will still cause delays; hard disk spooling is slower but can accommodate more and larger print jobs. Only three of the products listed—*Torq*, *LaserTorq*, and *SpoolMaster*—spool to RAM.

Typically, spoolers are single-user tools, but if you invest in cabling, some spoolers will direct output from eight or more PCs to as many printers. Extra features include the ability to set print job priority and to pause printing.

PRINTER CONTROL UTILITIES

If you're tired of typing intricate escape codes into your documents, consider a printer control program. This type of utility features plain-English menus that can let you easily embed codes in documents to change print quality, type style, character pitch, justification, and margins. Some of these programs offer a potpourri of extras, such as the ability to manage fonts, edit text, print sideways, and serve as print spoolers.

E-Z-Set

Orbit Enterprises

E-Z-Set is a setup utility for LaserJets and compatible printers. The menu-driven program also enables you to select cartridge fonts, change the number of printed lines per page, and switch between landscape and portrait modes. **List price:** $49.95. Requires 128K.

Reader service no. 620

LaserControl

Insight Development

LaserControl provides printer control features for the LaserJet, sim-

plifies using HP-compatible cartridge fonts and soft fonts, and enables the LaserJet to emulate dot matrix and daisy wheel printers from Diablo, Epson, IBM, NEC, and Qume. **List price**: $149. Requires 65K.

Reader service no. 621

LaserMenu

MicroLogic Software

LaserMenu supports LaserJets and compatibles and lets you select fonts, download soft fonts, generate lines and shading, control margin and line settings, and redirect output to different ports. Context-sensitive help is available. **List price**: $99.95. Requires 49K.

Reader service no. 622

LaserSet

Euro-Software Services

Menu-driven *LaserSet* lets you set up printer defaults such as printer port, paper size, lines per page, and graphics resolution for LaserJets and compatibles. The program also displays cartridge fonts on screen and gives you the ability to switch fonts during a print job. **List price**: $49.95. Requires 128K.

Reader service no. 623

PrintEase

SDG Innovations

In addition to providing printer control for laser, dot matrix, and ink jet printers, *PrintEase* can embed resident fonts and cartridge fonts in text. It also includes a built-in spooler that enables you to run several printers simultaneously. **List price**: $59.95. Requires 64K.

Reoder service no. 624

Printer Genius

Nor Software

Printer Genius offers printer control for laser, dot matrix, and daisy wheel printers, plus a one-line text editor, a spooler, and a file preview capability. **List price**: $89. Requires 32K.

Reoder service no. 625

PrintPro

Big D Software

PrintPro is shareware that provides printer control for laser, dot matrix, and ink jet printers and enables you to create drivers containing frequently used control codes. **List price**: $49.95. Requires 128K.

Reader service no. 626

Printworks for Dot Matrix

SoftStyle

Use this program to change type size, summon scientific symbols, and print foreign characters. *Printworks for Dot Matrix* also provides several font families, a font editor, and sideways printing. **List price**: $75. Requires 128K.

Reader service no. 627

Printworks for Lasers

SoftStyle

Printworks for Lasers offers utilities that simplify cartridge font selection and soft font downloading to the LaserJet Plus, Canon LBP-8, and Xerox 4045 CP. The program also provides sideways printing and a graphics-capture utility, plus Epson MX-80, IBM Graphics Printer, and Diablo 630 emulations. **List price**: $125. Requires 256K.

Reader service no. 628

FONT MANAGEMENT UTILITIES

Many users like to spruce up their output with cartridge or downloadable fonts, but using them can be tricky. The font management programs listed here streamline font selection and make it easy to load soft fonts into printer memory. Typically, they provide more font management capabilities than the printer control utilities, such as allowing you to embed fonts directly in your document. Most let you work with at least two fonts; some permit use of portrait fonts in landscape mode. Before buying one of these utilities, however, make sure it supports your printer, fonts, and software.

BackLoader

Roxxolid Corporation

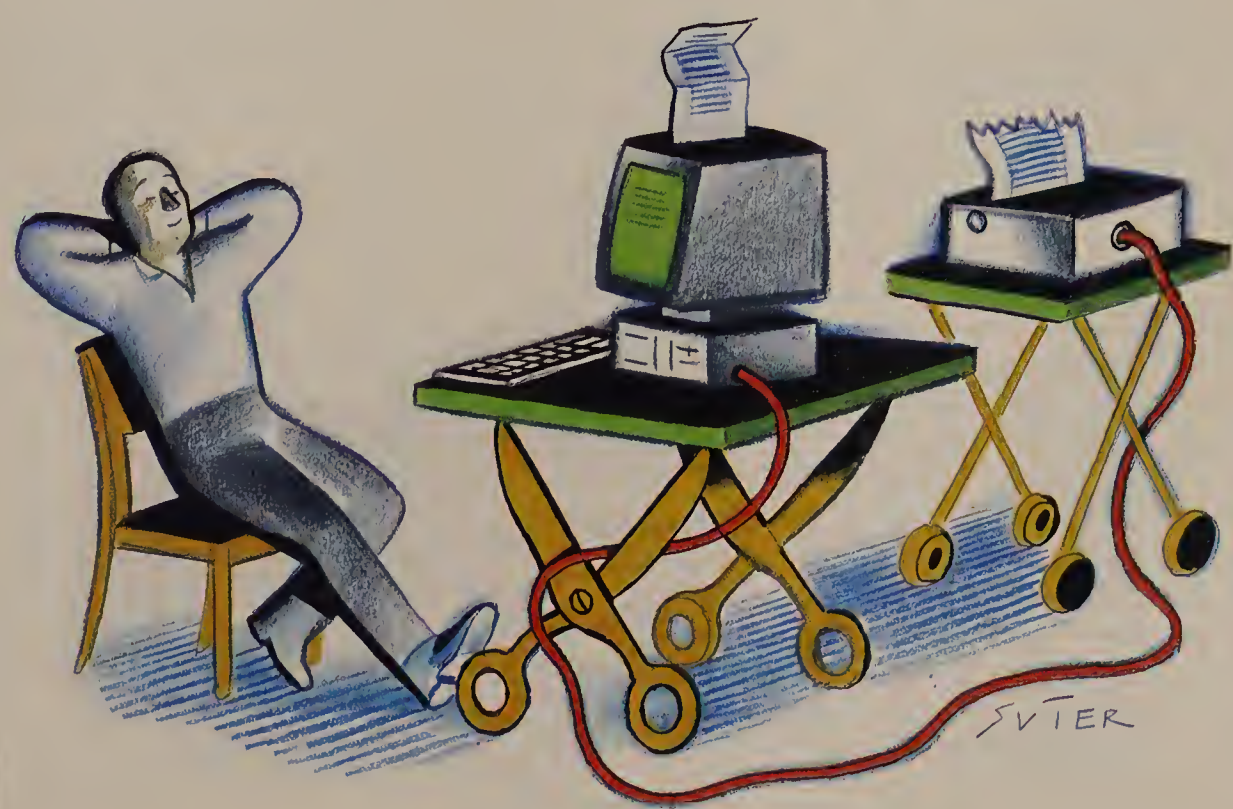
This memory-resident utility lets you download HP, Bitstream, and other soft fonts to the LaserJet and compatibles. It works in the background and provides a hot key so you can check on fonts in printer memory. It also lets you set a default font for *1-2-3* or *dBASE*. **List price**: $29.95. Requires 16K.

Reoder service no. 629

ConoFonts Manager

Conographic Corporation

Offering control over HP soft fonts as well as ConoFonts on the LaserJet Plus, *ConoFonts Manager* supports many popular programs such as *Microsoft Word*, *WordStar 2000*, *WordPerfect*, and *Ventura Publisher*. It also lets you control some



DAVID SUTER

TABLE 1: INTELLIGENT BUFFERS SPEED PRINT JOBS

MANUFACTURER Product	Input/output parts	Type of parts (serial, parallel)	Standard/maximum buffer size	Expansion memory/price	LAN support	List price	Reader service number
APPLIED CREATIVE TECHNOLOGY							
Buffer Box	1/1	User definable	64K/64K	n/a	NO	$299	650
Buffer Plus	1/1	User definable	64K/1MB	256K/$160	NO	$410	650
Printer Optimizer	1/1	2P	64K/1MB	64K/$49, 256K/$99	NO	$800	650
ASP COMPUTER PRODUCTS							
SimpLAN Intelligent Buffer	3/1	4P or 4S	256K/512K	256K/$155	YES	$395/$425	651
SimpLAN ServerJet II[1]	5/1	4S/1P	256K/1.25MB	256K/$195, 1MB/$695	YES	$495	651
Printer Server	6/4	10P	256K/512K	256K/$155	YES	$695	651
BAY TECHNICAL ASSOCIATES							
Print Master II 800 Series	4[2]	4S, 4P, 2S/SP	256K/1.25MB	256K/$129, 1MB/$359	YES	$395	652
	8[2]	6S/2P	256K/1.25MB	256K/$129, 1MB/$359	YES	$595	652
	10[2]	2S/8P, 10S	256K/1.25MB	256K/$129, 1MB/$359	YES	$695	652
Print Master 700 Series	6[2]	6S, 6P, 4S/2P, 2S/4P	512K/1MB	512K/$219	YES	$739	652
	8[2]	8S, 2S/6P, 6S/2P, 4S/4P	512K/1MB	512K/$219	YES	$795	652
	10[2]	10S, 8S/2P, 6S/4P	512K/1MB	512K/$219	YES	$895	652
BUFFALO PRODUCTS							
Buffalo CP	1/1	2P	256K/4MB	n/a	NO	$300	653
Buffalo XL	2/2	4P	256K/2MB	256K/$100, 1MB/$400	NO	$400	653
Buffalo SL	10[2]	6S/4P	256K/4MB	n/a	YES	$600	653
CABLE INT'L							
Parallel Buffers	1/2, 2/1	3P	64K/512K	n/a	NO	$130	654
DIGITAL PRODUCTS							
PrintDirector	6[2]	Any mix[3]	250K/2MB	250K/$250	YES	$695	655
	10[2]	Any mix[3]	250K/2MB	250K/$250	YES	$995	655
Net Commander	10[2]	Any mix[3]	250K/4MB	250K/$250	YES	$1985	655
DITRON							
MegaPrint[4]	1/1	1P	1MB/1MB	n/a	YES	$495	656
DUAL GROUP							
Smart Printer Buffer	1/1	2P	64K/256K	n/a	YES	$199	657
	1/1	2S	64K/256K	n/a	NO	$229	657
Multi-Spooler	2/2	4S, 4P	256K/1MB	n/a	YES	$329	657
	8/1	9S, 9P	256K/1MB	n/a	YES	$499	657
EMCO							
PB 64	1/1	2P	64K/256K	n/a	NO	$98	658
PB 64/2	1/2, 2/1	3P	64K/256K	n/a	NO	$153	658
DB Buffers	1/1	2P or 2S	256K/1MB	256K/$159	NO	$275/$300	658
	2/2	4P or 4S	256K/1MB	256K/$159	NO	$325/$360	658
	1/1	1S/1P	256K/1MB	256K/$159	NO	$360	658
EXTENDED SYSTEMS							
ShareSpool ESI-2041[1]	4/1	4S	256K/1MB	n/a	NO	$495	659
HANZON DATA							
Universal Data Buffer	2/2	2S/2P	64K/256K	64K/$75	YES	$399	660
KANSAI INT'L							
Buffer	1/1	2S	64K/64K	n/a	NO	$199	661
	1/1	2P	256K/1MB	256K/$199	YES	$599	661
LASERPLEX							
LaserPlex 50[1]	5/1	4S, 1P	256K/1.25MB	256K/$495, 1MB/$595	YES	$495	662
	8/1	8S	256K/1.25MB	256K/$495, 1MB/$595	YES	$595	662
PRINTMANAGER							
Laserspool[1]	3/1	4S	256K/2MB	n/a	NO	$445	663
PrintManager	5/1	6S	256K/500K	256K/$250	NO	$495	663
	6[2]	6S, 6P, 4S/2P	256K/1MB	256K/$250	YES	$845	663
	10[2]	10S, 6S/4P	256K/1MB	256K/$250	YES	$1195	663
PROTEC MICROSYSTEMS							
Byteprint	2/1	3P	8K/256K	n/a	YES	$199	664
	4/1	5P	8K/256K	n/a	YES	$309	664
	8/1	9P	8K/256K	n/a	YES	$469	664
Byteway 1000	4[2]	4S	64K/1MB	n/a	NO	$399	664
Byteway 1000 Plus	8[2]	8S, 6S/2P, 4S/4P	64K/1MB	n/a	NO	$549	664
Byteway 2000	10[2]	10P, 8S/2P, 4S/6P	64K/2MB	n/a	NO	$799	664
Bytelink	12[2]	Any mix[3]	64K/2MB	n/a	NO	$899	664
ROSE ELECTRONICS							
Caretaker Plus	4/1	5S, 5P	16K/256K	64K/$100, 256K/$240	NO	$395	665
	8/1	9S, 9P	16K/256K	64K/$100, 256K/$240	NO	$495	665
SuperSwitch	9[2]	7S/2P	64K/1MB	n/a	NO	$560	665
MasterSwitch	3[2]	Any mix[3]	64K/1MB	256K/$140, up to 1MB	YES	$395	665
	5[2]	5S, 5P, 2S/3P, 3S/2P	64K/1MB	256K/$140, up to 1MB	YES	$649	665
	9[2]	Any mix[3]	64K/4MB	256K/$140, up to 1MB	YES	$849	665
WESTERN TELEMATIC							
Lasernet	8/2	9S with 1P output	256K/2MB	512K/$1095	YES	$995	666
SmartSwitch INC64	8[2]	8S	256K/256K	n/a	YES	$1300	666
SmartSwitch	16[2]	16S	16K/16K	n/a	YES	$1895	666

[1] Fits in LaserJet Series II and IID only.
[2] Ports are user definable as input or output.
[3] User may state desired configuration when placing order.
[4] Fits into PC's expansion slot.

TABLE 2: SPOOLERS—A CHEAP PC-TO-PRINTER SOLUTION

MANUFACTURER	Product	RAM required	Maximum number of PCs	Maximum number of peripherals	LAN support	List price	Reader service number
CONSUMERS SOFTWARE	Duet	70K to 130K	1	1	NO	$89.95	670
HAAR INDUSTRIES	HAARspool	16K	2000	10[2]	YES	$300	671
	Prinbuf	16K	2000	10[2]	YES	$300	671
	Auxprint[1]	16K	2000	10[2]	YES	$600	671
LASERTOOLS	Torq[3]	15K[5]	1	1	NO	$79	672
	LaserTorq[4]	19K[5]	1	1	NO	$99	672
RITE SOFTWARE	PrintRite	50K	1	5	NO	$99.95	673
SERVER TECHNOLOGY	EasyPrint	24K	1	3	NO	$49.95	674
	EasyPrint-2	24K	2	6	NO	$95.95	674
	EasyPrint-4	24K	4	12	YES	$399.95	674
SOFTWARE DIRECTIONS	PrintQ	55K	1	3	NO	$149	675
	PrintQ Share	55K	8	5	NO	$299	675
SOFTWARE MASTERS	Spool-Master[6]	8K plus buffer	1	1	NO	$69.95	676

[1] Serial printers only.
[2] Supports 10 printers per PC, up to 2000 per network.
[3] Optimized for nonlaser printers.
[4] Optimized for laser printers.
[5] Can also spool to conventional, EMS, EEMS, or extended memory.
[6] User specifies buffer size, up to 999K; spools to RAM. Requires Flash caching program ($69.95) to spool to hard disk.

printer settings. **List price:** $70. Requires 256K.
Reader service no. 630

DwLaser
Koch Software Industries
DisplayWrite users with a DeskJet- or LaserJet-compatible printer can use *DwLaser* to combine HP cartridge fonts with soft fonts from either HP or Koch. **List price:** $195. Requires 64K.
Reader service no. 631

Easy Fonts
ERM Associates
Memory-resident *Easy Fonts* downloads HP soft fonts to LaserJets and compatible printers. The program can list the soft fonts on your hard disk and print portrait fonts in landscape orientation. **List price:** $59.95. Requires 256K.
Reader service no. 632

JetSet
Intex Solutions
JetSet is an add-in utility that allows *1-2-3* and *Symphony* users to dress up their output with HP cartridge and soft fonts. Other talents include the ability to print sideways and condense text. The program supports the LaserJet and LaserJet Plus. **List price:** $95. Requires 70K.
Reader service no. 633

Polaris Font Control
Polaris Software
With *Font Control*, LaserJet Series II users can download HP-compatible soft fonts and cartridge fonts for *Word* or *WordStar 2000* documents. **List price:** $99. Requires 256K.
Reader service no. 634

PrintMenu
MicroLogic Software
Dot matrix and ink jet printer users will appreciate this package for batch file loading of soft fonts and easy sideways printing of *1-2-3* spreadsheets. It also provides context-sensitive help and printer control. **List price:** $69.95. Requires 70K.
Reader service no. 635

Soft Font Manager
Human Touch Software
The *Soft Font Manager* downloads HP-compatible soft fonts to LaserJet Series II–compatible printers. It also creates font sets for one-step downloading, tracks available printer memory, and lets you set up *Word* and *WordPerfect* to use any combination of soft fonts. **List price:** $69.95. Requires 256K.
Reader service no. 636

VS Tool Kit
VS Software
VS Tool Kit provides font control for HP LaserJet Plus and Series II compatibles. The program supports several word processors and also lets you customize printer drivers for *Word*, *WordPerfect*, and *XyWrite*. **List price:** $150. Requires 512K.
Reader service no. 637

DEVICE EMULATORS

Device emulators are a quick and inexpensive way to upgrade your output by enabling your printer to mimic an output device with higher resolution. These programs improve the appearance of your documents but generally increase printing time.

The Image Printing Utilities
Image Computer Systems
The Image Printing Utilities let 9-pin dot matrix printers produce output with 24-pin quality. The program also supplies 16 fonts, which you can mix and match within a document. **List price:** $89.95. Requires 128K.
Reader service no. 638

LQPatch
M.A.P. Systems
If your application software lacks a 24-pin dot matrix printer driver, you can use memory-resident *LQPatch* to translate 9-pin graphics commands into Epson LQ 24-pin graphics commands. The program also claims to correct vertical elongation problems. **List price:** $39.95. Requires 12K.
Reader service no. 639

PrintAPlot
Insight Development
PrintAPlot interprets plotter commands to produce output on laser, dot matrix, and ink jet printers. Graphics can be printed in color or in shades of gray. The program also allows you to scale graphics and modify line width. **List price:** $199. Requires 256K.
Reader service no. 640

Publisher's Powerpak
Atech Software
For users of *Ventura Publisher* and *First Publisher*, this program allows dot matrix and ink jet printers to emulate a LaserJet Series II. The package includes a library of three fonts and a font manager. You can scale typefaces from 6 to 250 point and vary style and pitch. **List price:** for *Ventura Publisher* $199.95, for *First Publisher* $79.95. Requires 512K.
Reader service no. 641

Matt Lake is the Andrew Fluegelman intern for PC World. *Wes Nihei is an assistant editor for* PC World. ●

WHERE TO BUY

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Hanzon Data
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206/487-1717

Human Touch Software
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Sacramento, CA 95826
916/369-1261

Image Computer Systems
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Avon, CT 06001
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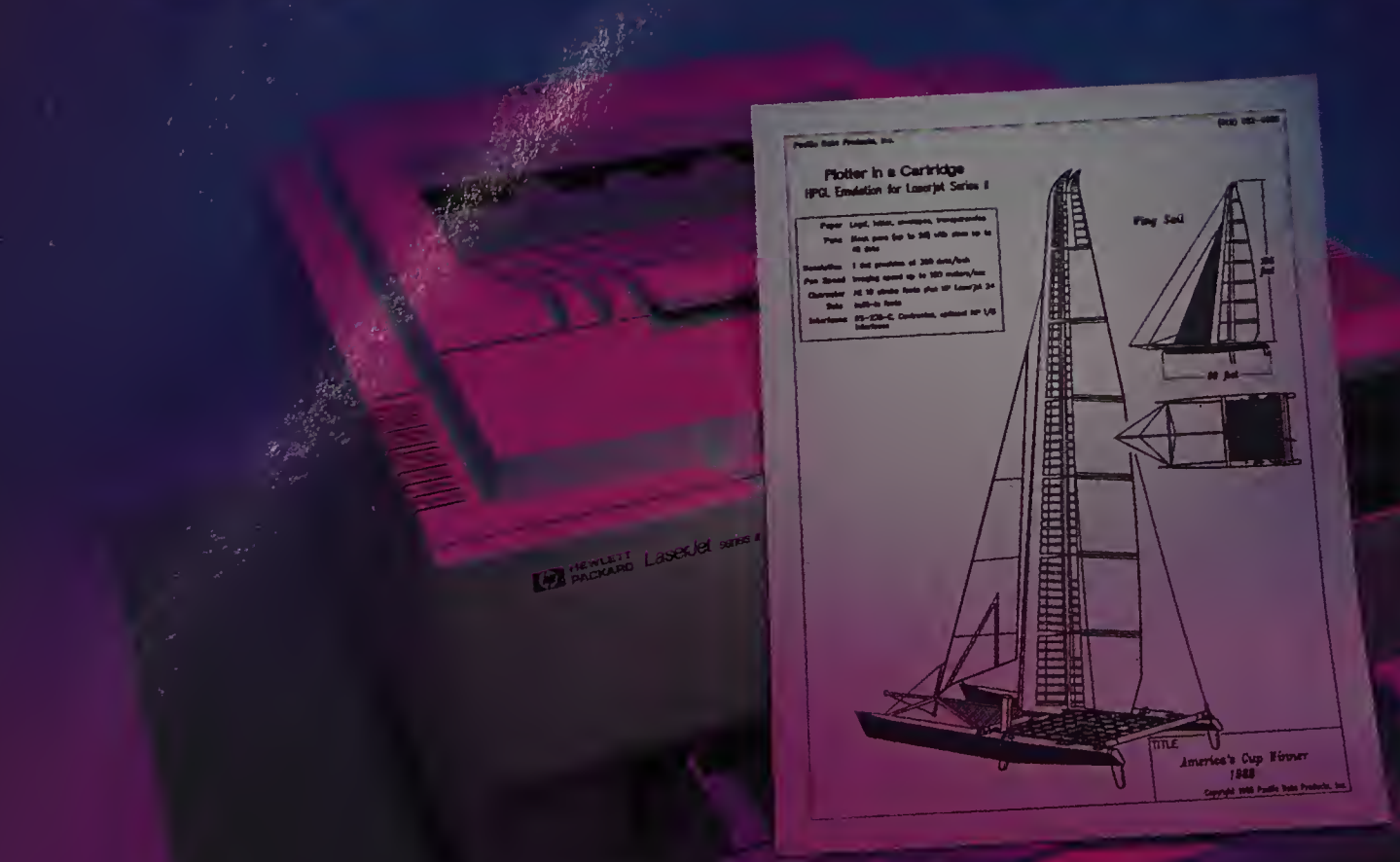

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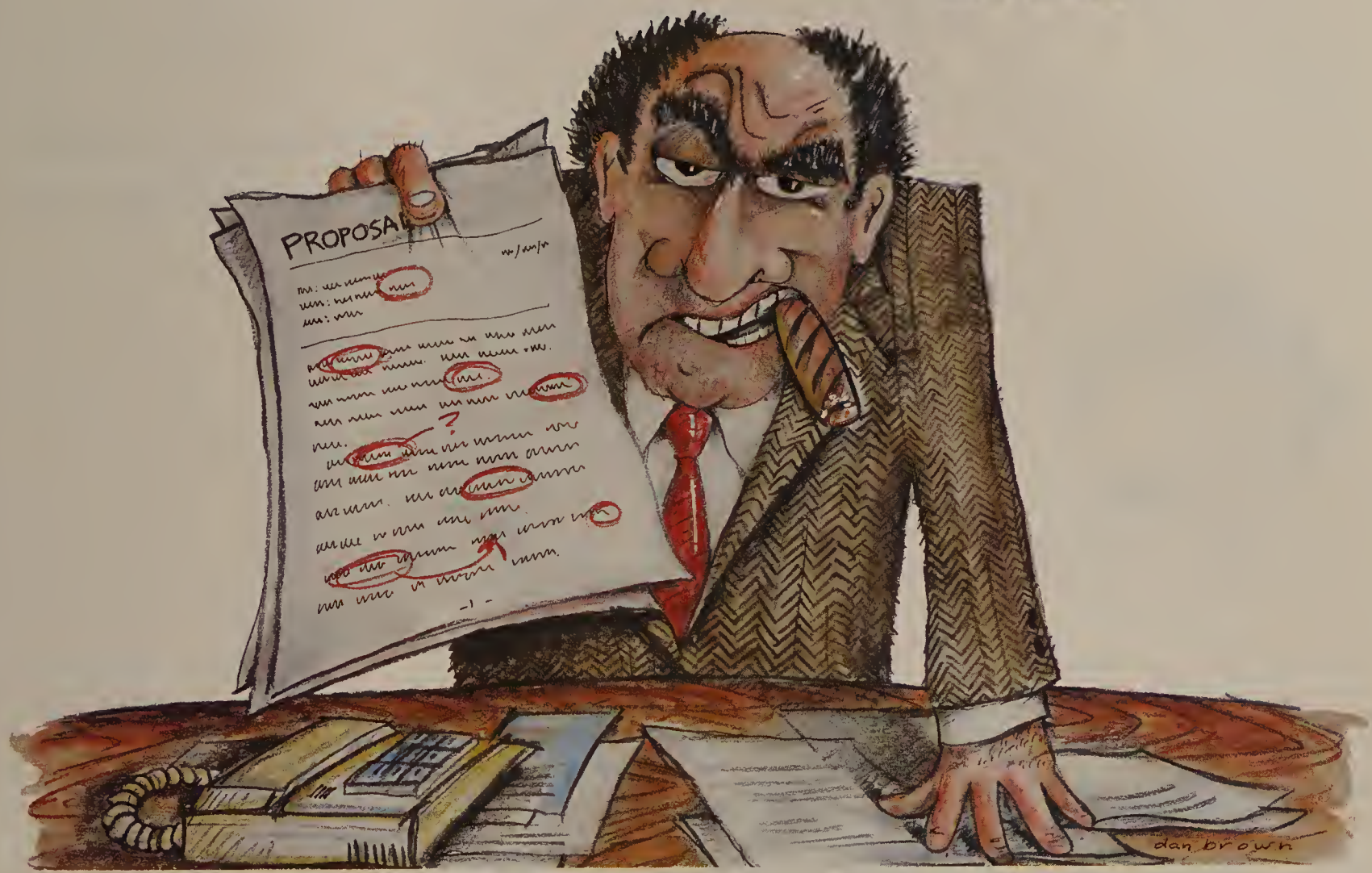

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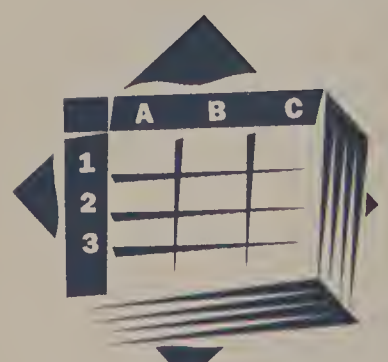
Macro Secrets for 1-2-3

The developer of 101 Macros for Lotus 1-2-3 shares a potpourri of programming tricks—and provides six helpful macros sure to enrich anyone's macro library.



Spreadsheets

E. Michael Lunsford

INSIDE HOW TO

TIPS & TECHNIQUES

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If you accidentally delete a subdirectory or format your hard disk—and everyone does, eventually—these expert tips may save the day.

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During the process of creating and upgrading *101 Macros for Lotus 1-2-3*, I developed a few favorite macros—some because they solve nagging problems, others because they include unique programming tricks.

In this article I'll share macros for *1-2-3* release 2 that are both useful and tricky. You'll find macros that let you sum and underline a column of numbers, instantly hide any number of columns, view and make changes within a hidden column, visit a remote location and return quickly, change the width of a group of columns, and judge the width of a print range before printing.

Perhaps more important, you'll also discover new ways to use @ functions and macro commands, as well as learn some handy tricks employing a bogus subroutine name and *1-2-3*'s little-known ability to interrupt command sequences to accomplish interim tasks.

Even readers who aren't familiar with *1-2-3* macro programming can use these routines. Simply type in the macro code as shown in the figures. Then, with the cell pointer on the macro's name (for example, /S), use the /Range Name Labels Right command and press <Page Down> <Enter> to name the ranges. To use the macros, place your cell pointer where you want the macros to run; then press <Alt> and the appropriate letter key.

You may want to save these macros in a new worksheet file called MACROS. Then, to use the macros in other files, simply retrieve another file, move to a blank area, and select /File Com-

bine Copy Entire-File MACROS. Since range names are lost using /File Combine, rename all the ranges using Range Name Labels Right <Page Down>.

@Sum Macro: <Alt>-S

Instead of summing a column manually with @Sum, use the <Alt>-S macro starting two rows below the column you want to sum (see **FIGURE 1**). The macro moves the cell pointer up one cell and uses the @Repeat function to create a dashed subtotal line, which is one character less than the column width. Then the macro moves the cell pointer back down one cell and types the @Sum formula, including the range. This macro saves you 11 to 18 keystrokes with every use.

Hide Columns Macro: <Alt>-H

Hiding columns in a worksheet is useful, especially for printouts, but hiding noncontiguous columns can be tedious because you have to use the Worksheet Column Hide command repeatedly. Instead, try <Alt>-H, which allows you to select and hide any group of columns at once.

The first line of the macro starts the Worksheet Column Hide command (see **FIGURE 2**, top), which generates the prompt 'Columns to Hide:'. The macro interrupts that command with a {get} to collect your next keystroke at the cell named HKEY.

If the keystroke entered into HKEY is <Esc>, four <Esc> commands will back you out of the command line and the macro will quit. If the keystroke is <Enter>, indicating that you accept the column offered at the prompt, the macro branches to the range named HSKIP.

Otherwise, the first character you hit is stored in HKEY, which the macro reads. This *self-modifying* technique is faster than setting up HKEY as a subroutine using {branch} and {return} commands. The {?} pauses for the other keys you press (such as new range of columns) until you press <Enter>, at which point the macro continues at HSKIP.

At HSKIP, the cell pointer is moved one cell to the right, just beyond the columns to be hidden; the {let} command creates a place marker in the cell called HERE. The cell pointer is then moved back one cell to the left, and a ~ (<Enter>) completes the Worksheet Column Hide command.

Then the macro goes to the address saved in the cell named HERE (your place marker cell), and the branch command starts the macro all over again—until you press <Esc> or <Ctrl>-<Break> to stop it.

```
\S      {up}@repeat("-",@cellpointer("width")-1){calc}{home} {down}
        @sum({up}.{end}{up}..)~{quit}
```

FIGURE 1: Use the @Sum macro to add up a column of numbers quickly.

```
\H      /wch{get HKEY}{if HKEY="{esc}"}{esc 4}{quit}
        {if HKEY="~"}{branch HSKIP}
HKEY
        {?}
HSKIP   {right}{let HERE,@cellpointer("address")}{left}~
        {goto}
HERE
        ~{branch \H}


\V      {menubranch VMENU}{quit}
VMENU   View                        Rehide
        View all hidden columns     Rehide all columns marked as hidden
        {paneloff}                  {paneloff}
        /c{CTRL_BREAK}              /c{esc 3}{right}{left}{quit}
```

FIGURE 2: The Hide Columns macro, \H (top), lets you hide even noncontiguous columns. To see the columns you've hidden—and even make changes in them—try \V (bottom), the View Hidden Columns macro.

View Hidden Columns Macro: <Alt>-V

Having gone through the trouble of hiding columns, having to "unhide" and "rehide" them simply to make minor changes can be even more frustrating. Use <Alt>-V instead (see **FIGURE 2**, bottom).

The {menubranch} command in this macro generates a menu

```
\G      {goto}{GLAST}{get GKEY}{if GKEY="~"}{branch GLOOP}
        {if GKEY="{esc}"}{esc 3}{quit}
        {let GLAST,@cellpointer("address")}{esc}{esc}
GKEY    ~
        {quit}

GLOOP   {esc}{esc}{let GLAST2,GLAST}
        {let GLAST,@cellpointer("address")}
        {GLAST2}~{up 3}{left 2}{goto}{GLAST2}~{quit}
GLAST   A1
        {return}
GLAST2  A1
        {return}
```

FIGURE 3: The Go-Return macro lets you jump quickly to a remote location and then return to your starting point.

with two choices: View (view all hidden columns) and Rehide (rehide all columns marked as hidden). Note that these menu items and the respective text below each item should be typed into adjacent columns. If you select View and then press <Esc> when you see the ERROR message, the hidden columns will be revealed, identified at the top of the screen by an asterisk after the column letter. The macro accomplishes this with a handy trick. The Copy command is used to show the hidden columns; then it's interrupted by an error-generating command—in this case, a subroutine call to the bogus range name CTRL_BREAK. Oddly enough, this maneuver allows you to make entries in the hidden columns.

To make the hidden columns disappear again, press <Alt>-V and select Rehide. The macro repeats the Copy command to return the asterisked columns to their hidden state.

Go-Return Macro: <Alt>-G

This navigational aid not only remembers where you were before you visited a remote location, it also remembers the remote location. You can jump back and forth instantly between the two sites simply by pressing <Alt>-G and then <Enter>.

When you press <Alt>-G, you are offered a previous cell address; you can either accept that address, point to a cell and hit <Enter>, or enter a new destination.

The magic of this macro is another interruption, this time to a {goto} command (see **FIGURE 3**). The {goto} in the first line of the macro tells the cell pointer to go to the "remembered" address (GLAST), but this command is interrupted before it is completed. If you press <Enter> to accept the offered address, the address is saved in GLAST2 while the address of the current cell is stored in GLAST, where it acts as a place holder. The Go-Return macro can then return to that same cell the next time you use the macro.

If, instead of accepting the address that's offered, you type in or point to a new location, the current cell address is saved in GLAST before the {goto} command is completed.

After the {goto} sequence executes, the macro conveniently adjusts the destination cell toward the center of the screen. This is accomplished with the {up 3}{left 2} commands just before the final {goto}{GLAST2} instruction. Note that you'll get a beep if the cell is in column A or B, or in row 1, 2, or 3.

Width of Columns Changed Macro: <Alt>-W

To quickly change the width of a group of columns, try <Alt>-W (see **FIGURE 4**). Simply respond to the prompt 'Enter the revised column width' and then, at the prompt 'Which columns?', highlight the columns you want changed and press <Enter>.

The trick here is using Range Name Create to create a kind of

```
\W      {windowsoff}{paneloff}
        {getlabel "Enter the revised column width: ",WIDTH}
        /rncWhich columns?~~/rndWhich columns?~
        /rnc{panelon}Which columns?{windowson}~{?}~{windowsoff}
        {paneloff}{goto}Which columns?~
        {for WCOUNT,1,@cols(Which columns?),1,WREV}
        {left @cols(Which columns?)}/rndWhich columns?~
        {quit}
WREV    /wcs
WIDTH
        ~{right}{return}
WCOUNT
```

FIGURE 4: Need to make changes in the width of a bunch of columns? The Width of Columns Changed macro makes it simple.

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prompt. Creating a range named 'Which columns?' lets the macro simultaneously identify the purpose of the range and prompt you for a range to enter. Note that the range is created, deleted, then re-created in case the range named 'Which columns?' remains from a previous use of this macro that was interrupted with <Ctrl>-<Break>.

The column widths are changed with a {for} loop that repeats the Worksheet Column Set-Width command for each column you highlighted.

Judge Width of Print Range Macro: <Alt>-J

<Alt>-J is an efficient way to determine whether the data you want to print will fit on the paper (see **FIGURE 5**). This macro initially displays the last print range selected. You can press <Enter> to accept that range or press <Backspace>, select a different range, and then press <Enter>. The width of the range, in characters, will display at the top of the screen.

One important note: When you create this macro, type the range names on the left side and use the Range Name Labels Right <Page Down> command before typing the rest of the macro. Otherwise you won't be able to type the macro line that is adjacent to the name J_MENU; the macro line is a formula that references the range name JWIDTH.

This macro begins by creating a place marker for the current cell in the cell named JHERE. Then it issues the Print Printer Range command and pauses until you either accept the range offered or enter a new range. This command sequence is interrupted while the windows and panels are turned off and the macro highlights the range again, saves the address of the lower right cell in JADDR, then adds two periods and the upper left cell's address to the address in JADDR. Then the macro exits the Print command line and establishes a new range called JRANGE, using the range saved in JADDR.

```
\J      {let JHERE,@cellpointer("address")}
        ~/ppr{?}{windowsoff}{paneloff}~
        r{let JADDR,@cellpointer("address")}..
        {let JADDR,@cellpointer("address")&".."&JADDR}
        {esc 4}rncJRANGE~
JADDR
        ~{goto}JRANGE~{blank JWIDTH}
        {for JCOUNT,1,@cols(JRANGE),1,JLOOP}
        {recalc J_MENU}{goto}{end}{home}
        {down}{panelon}{menubranch J_MENU}
J_MENU  +"Print range is "&@STRING(+JWIDTH,0)&" characters wide."
        Press Enter.
        {esc}{paneloff}/rndJRANGE~{goto}
JHERE
        ~{quit}
JLOOP   {let JWIDTH,JWIDTH+@CELLPOINTER("WIDTH")}
        {right}{return}
JWIDTH
JCOUNT
```

FIGURE 5: Use the Judge Width of Print Range macro to determine whether your worksheet will fit on the printer paper.

At this point it's relatively easy for the macro to go through a {for} loop that adds up the widths of all the columns in JRANGE with subsequent passes of a {let} command, which saves them in JWIDTH. That done, the macro recalculates the underlying string formula in the cell named J_MENU.

The macro then goes to a cell that is guaranteed to be blank since it is one cell below the {end}{home} location (this ensures that no distracting entries appear in the edit line) and calls up the menu J_MENU. This illustrates another handy trick: The {menubranch} command generates a highlighted, single-choice menu to provide what looks like a two-line prompt. The macro then returns the cursor to the cell you started the macro from (which is saved in JHERE).

The <Alt>-J macro not only displays the width of the new range in characters, it takes advantage of the Print Printer Range command's capability to "remember" the range when you select that command again.

Getting the Most Out of 1-2-3

If you've written and used macros before, these routines should make valuable additions to your macro library. If, on the other hand, you're just beginning to explore the world of macros, these tips and tricks may help you realize more of *1-2-3*'s potential. ●

E. Michael Lunsford is vice president of Individual Software in San Carlos, California, and developer of 101 Macros Plus for 1-2-3.

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TIPS & TECHNIQUES

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Integrating Microsoft Works

With Microsoft Works, data-moving macros pave a fast track to integrated power. A few well-chosen keystrokes now can save hours of tedium later.

What you need: Microsoft Works

Microsoft Works' individual modules are capable enough, but using macros to transfer data between them really unlocks the package's power. This article will show how to write *Works* macros that quickly move information between the data base, spreadsheet, and word processor. It also explains how to create a macro that greatly speeds chart making.

How to Record and Save Works Macros

If you haven't used *Works* macros, this quick exercise will get you started. First install the separate macro program MSKEY.COM and load it; then run *Works*. Invoke MSKEY by pressing **<Alt>-/**. To begin recording a macro that is triggered by <Ctrl>-N, for example, press **MR** (Macro Record), then **<Ctrl>-N**. Type your first and last names. End recording by pressing **<Alt>-/**, and then **ME** (Macro End). Now, whenever you press **<Ctrl>-N**, you should see your name spelled out.

To save your macros, you must write them to a disk file. Press **<Alt>-/FS** to invoke MSKEY's File Save command. Then type a name for the file in which you'll store your macros. If you later want to list the macros for reference, press **<Alt>-/FL** (File List).

Create a Cut-and-Paste Macro

If you frequently cut and paste data between modules, a simple macro can automate the transfer. In this example, we'll move worksheet figures into a word processing file.

In any worksheet, press **<F8>** to extend the cursor, and mark the cells you want to copy. Press **<Alt>-/MR** to begin recording the macro. Call it **<Ctrl>-C** (for Copy).

Press **<Shift>-<F3>**, the spreadsheet's Copy command. Press **<Alt>-W** to pull down the Window menu. Press **<Alt>-/MF** (the fixed length command) to instruct the macro to record the number of characters you will enter next. (When the macro executes, it will pause for input after it pulls down the Window menu.) Type the number that corresponds to the word processing window where you want to put the worksheet data, then press **<Alt>-/MF** to mark the end of the field. Whatever number of characters you type, the macro will expect all future answers to the Window prompt to be of the same length. Press **<Alt>-/ME** to end recording the macro.

To use the macro, mark the cells you want to copy, press **<Alt>-/** to invoke MSKEYS, then press **<Ctrl>-C**. This leaves you in the destination file but still in Copy mode; to complete the operation, put the cursor where you want to paste the data and press **<Enter>**.

Moving Data From the Data Base to the Spreadsheet

In this example, we'll use a macro to quickly extract some employee travel expense data from a data base and move it into the spreadsheet. The macro uses the data base's Report option to summarize each individual's monthly expenses; then the macro writes the data to disk, and brings it into the spreadsheet module.

Before you start, create a dummy TEMP file in the data base. Then open a new data base file and set up columns for Name, Month, and Cost. Enter a dozen lines of sample data with January, February, and March expense figures for four employees. Create the report shown in **SCREEN 1**, then select it from the Reports menu.

Press **<Alt>-/** and **MR** to begin macro recording, and name the macro **<Ctrl>-R** (for Report). Press **<Alt>-RA** to pull down the Reports menu.

Now press **<Alt>-/MV** (MSKey's Vfld, or Variable Length Field, command) to instruct the macro to record all keystrokes until you press the <Enter> key. Unlike the previous macro, this one's prompt will expect future responses to vary in length.

Now enter **TEMP** as the report's temporary file name. You'll be asked if you want to overwrite the existing Temp file; answer yes. (This way, when you

run the actual macro later, it will automatically overwrite older Temp files.) Press **<Alt>-/MV** to mark the end of the variable field. Press **<Enter>** to complete the file name entry. Press **<Alt>-FO** (File Open); type **Temp** as the name of the file to open, and press **<Enter>S<Enter>** to open the file as a spreadsheet. Press **<Alt>-/ME** to end macro recording.

Grabbing Data Series for Charts

Charting data in *Microsoft Works* is straightforward, but highlighting data series can be tedious. With this macro, you can grab data for each series with a single keystroke. The macro is especially powerful because it pauses each time you select a new data range.

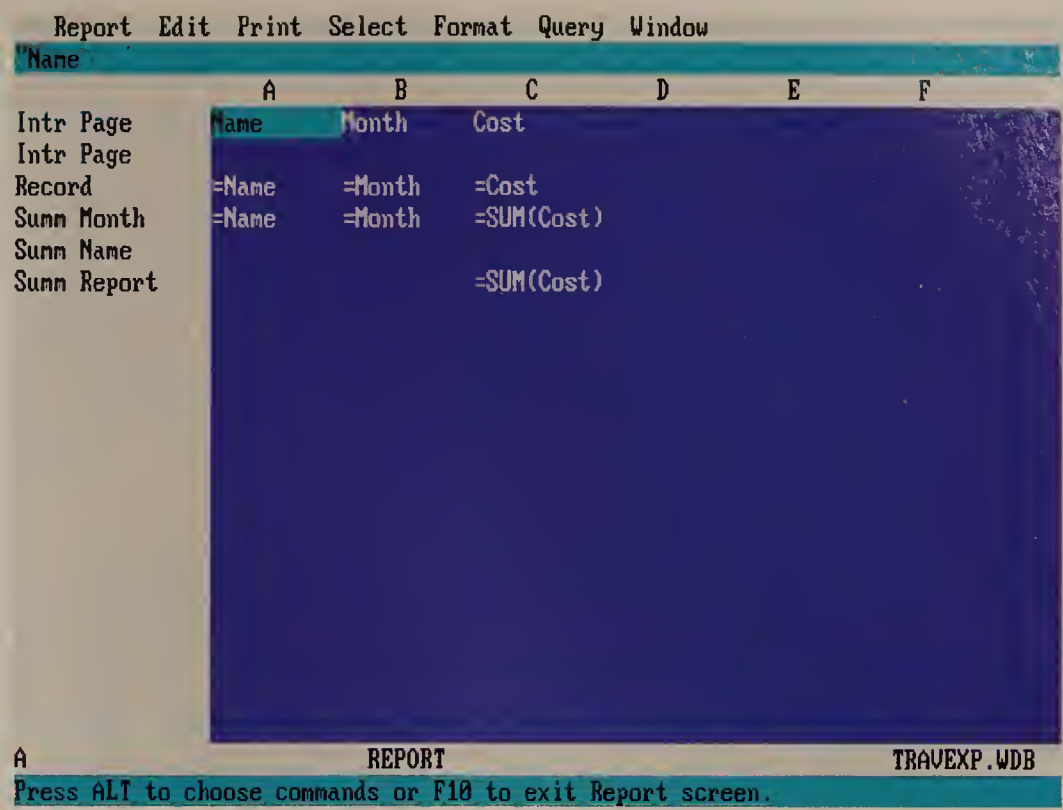
The macro is designed to use the Temp report data in the spreadsheet (see **SCREEN 2**). With a different data layout, the macro keystrokes will vary slightly.

Open the Temp worksheet and enter Chart mode by pressing **<Alt>-CD**. Position the cursor at the top of the sequence of data you want to enter as successive series in the chart. Press **<Alt>-/MR** to begin recording, naming the macro **<Ctrl>-G** (for Grab). Press **<F8><Cursor Down><Cursor Down>** to extend the cursor and select the three cells of the first series (Johnson's January through May expenses, in the example), then press **<Esc>** to end the Extend mode. Press **<Alt>-D** to enter the Data menu.

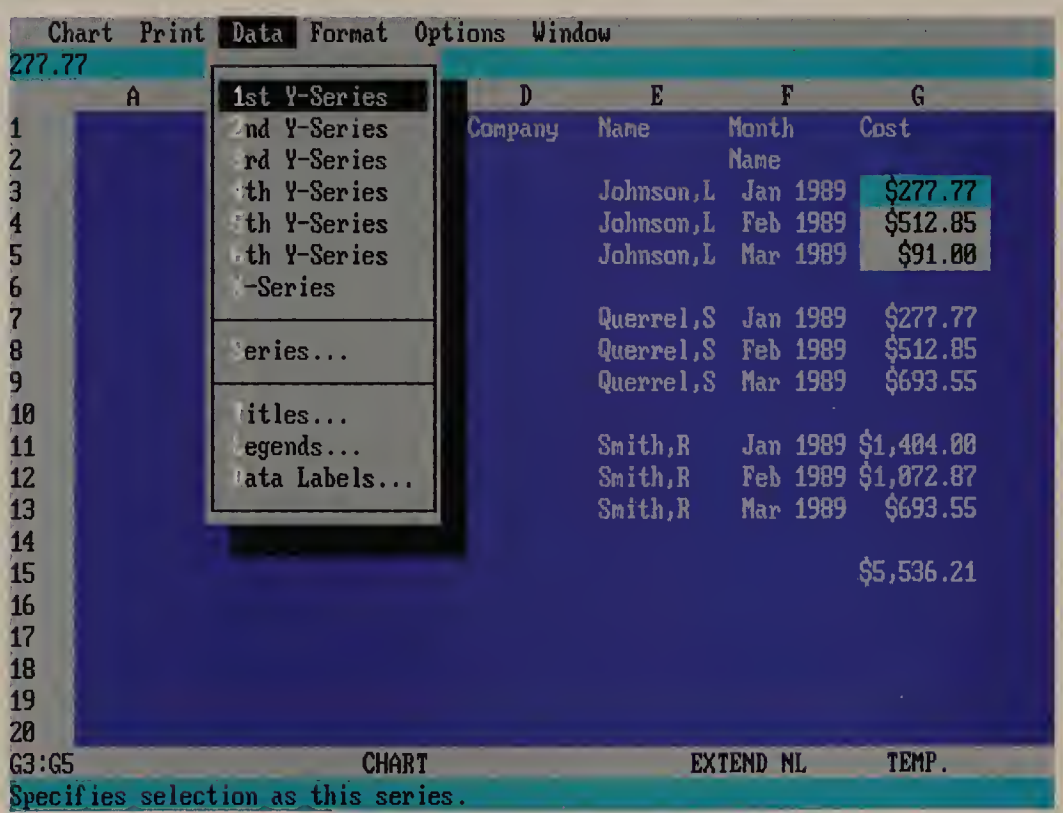
Now press **<Alt>-/MF** to instruct the macro to record the number of characters you will enter next. Press **1** to indicate that this is the first series. Then press **<Alt>-/MF** again to mark the end of the field. Press **<Cursor Down>** four times to move to the first cell of the next series. Press **<Alt>-/ME** to end recording.

To test the macro, press <Ctrl>-G several times. Each time the macro executes, it should open the Data menu and prompt you for the series number (1 through 6); when you type the number in, the macro should jump to the next series, ready for the next number.

—Robert Carr



SCREEN 1: This Works report will generate summaries of the data base, broken down by individual, month, and cost.



SCREEN 2: As the charting macro executes, you're prompted to type the series number of the highlighted data.

Hard Disks

How to Recover From Hard Disk Disaster

An expert offers cures for everything from deleted files to unbootable drives

What you need: a floppy with the same DOS version as your hard disk, a hard disk utility package

If we always did what was good for us, we'd use the preventive maintenance programs in *The Norton Utilities*, *PC Tools*, or *Mace Gold*. We'd do daily backups, run CHKDSK, optimize the disk regularly, park the heads, keep the computer environment clean, and run low-level formats (see "How To Prevent Hard Disk Disaster," *PCW*, February 1989). But since we don't always do what's good for us, this article is designed to help you get out of tight spots.

As in all troubleshooting, it's best to work from the simple to the complex. If there's an easy way out, such as restoring your backup, take that route and skip the heroics. And if a major hardware disaster strikes, get professional help. Certain services can recover data even from charred computers whose heads have crashed (see the sidebar "Friends in Need").

Erased Files or Subdirectories

If you inadvertently erase a file or delete a whole directory, don't fret—but don't write any new information to disk, either. If your disk isn't too fragmented, you can retrieve your files with an unerase utility provided by *Norton*, *Mace*, or *PC Tools* (see *The Software Shelf* in this issue). This is possible because neither DEL nor ERASE really erases data; they just remove information from the File Allocation Table (FAT) that tells DOS where the pieces of the file are (see "Understanding CHKDSK" in this month's *Help Screen*). All but the first letter of the file name remains intact, so you should be able to recognize it.

If you have to recover a lot of files, take advantage of the utility's offer to print a list of the deleted files it can recover. Recover the smallest files first; reassembling the pieces of a large file could overwrite the smaller files before you get to them.

Optimizing a disk regularly makes complete file recovery more likely because it places each file in contiguous sectors. Tracking down severely fragmented files may require a sector editor; both *Norton* and *Mace* offer one. Want to practice? Run the tutorial in *Norton Utilities Advanced 4.5* (see *The Software Shelf*, *PCW*, April 1989).

Accidentally Formatting Drive C:

Just as DEL doesn't really erase your data, only the information on where to find it, DOS's FORMAT command constructs a gridwork but doesn't write information within it. Instead, it writes zeros over the FAT and root directory, leaving the data area untouched—including subdirectory information such as file names, the starting cluster for each file, and file size. With the subdirectory information, *Norton* and *Mace* can rebuild your FAT using their disk scanning, unerase, and root directory recovery utilities.

Cross-Linked Files

Ever find you can't open a file, even though it's listed in the directory? Try running CHKDSK/F. More often than not, the file has become cross-linked with another, which means two files are listed as having information in the same cluster. Since each cluster must be assigned to a unique file, one of the file's cluster locations is wrong and must be corrected.

Write down the names of the cross-linked files. Copy the files to a floppy disk, and load or run each of the copies to find out

FRIENDS IN NEED

Even if your computer goes through a fire, these people may be able to retrieve your hot data.

Ontrack Data Recovery
6200 Bury Dr.
Eden Prairie, MN 55346
800/752-1333

California Disk Drive Repair
3350 Scott Blvd., Bldg. 59
Santa Clara, CA 95054
408/727-2475

JB Technologies, Inc.
21011 Itasca St., Ste. F
Chatsworth, CA 91311
818/709-6400

Data Recovery Service
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San Francisco, CA 94131
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Circle 212 on reader service card

Hard Disk Utilities and Their Talents

Peter Norton is the best-known hard disk savior, but keeping any of these utilities close at hand will save you grief when trouble strikes.

Functions	Norton Utilities Advanced 4.5	PC Tools Deluxe 5.0	Mace Gold	HTest/HFormat 2.0	SpinRite 1.2	Disk Technician Advanced 1.2
Optimizes/defragments disk	✓	✓	✓		✓	
Sets interleaf	✓			✓	✓	
Surface analysis	✓	✓		✓	✓	
Controller analysis	✓			✓	✓	
Runs mechanical read/write tests	✓			✓		✓
Unerases files	✓	✓	✓			
Unerases directories	✓	✓	✓			
Unformats	✓	✓	✓			
Performs nondestructive low-level format	✓	✓	✓	✓		✓
Track/sector editor	✓	✓	✓	✓		
System area editor	✓	✓		✓		
Analyzes/edits FAT	✓	✓		✓		✓
Edits/repairs boot area	✓	✓		✓		
Recovers files automatically	✓					
Recovers directory	✓					
Parks disk heads	✓	✓		✓		✓
Backup program	✓	✓				
System image backup	✓	✓				

which one is corrupt. If the bad file is a .COM or .EXE file, replace it with a trustworthy backup; never use a potentially corrupted application. If it's a data file, delete it to remove the cross-link, then use your disk utility's unerase feature to rebuild its FAT entry and recover the original file.

Directory Sectors Go Bad

Sometimes your directory listing looks scrambled, or files you *know* are there aren't listed. Or when you try to access your files, DOS whines 'File allocation table bad' or 'General failure reading drive C:'. The best solution is to run *Norton* or *Mace*, which offer easy-to-use utilities for restoring your directory sectors. If these programs are still on your shopping list (and not on your disk, where they belong), here's how to run DOS's RECOVER command to laboriously retrieve at least some of your files.

RECOVER can't restore file names or extensions, file size, original date and time stamps, or file attributes. But it can salvage file data and keep you from writing to bad spots on the disk.

Using BACKUP, COPY, XCOPY, or some other copy/backup utility, salvage what you can by copying onto floppy disks all the files you can still access on your hard disk. Print out a directory for each floppy as a checklist to work from.

Now take a deep breath, and type DEL *.*. Boot from a floppy and enter A:RECOVER C:. RECOVER creates a separate file in the ROOT directory for each chain it finds. It names the first chain FILE0000.REC, the second chain FILE0001.REC, and so on until it reaches the root directory's capacity limit (which varies for different disks).

Once it hits that limit, RECOVER gives you a 'WARNING—directory full' message. Copy all the recovered files onto floppies, and then erase those files from the hard disk. Run RECOVER again until it runs out of files to create. Be sure to copy each batch of recovered files and number the floppies in case you overwrite different chains that have the same file name.

Now that you have all these FILE*nnnn*.REC files, what do you do with them? If you don't have *Norton*, you have to TYPE or open each one in an application to identify and then rename it—a laborious task. (Remember to delete trashed program files and simply restore the original application in its entirety.) *Norton* and *Mace* restore file names and attributes; DOS's RECOVER is a last resort.

The Disk Won't Boot

If you get any kind of 17*nn* error during your computer's power-up sequence, your disk controller is probably in trouble, and you should have your computer professionally serviced. But if DOS tells you 'Disk boot failure', 'Non-system disk or disk error', 'Bad or missing command interpreter', or 'Error loading operating system', try booting from a floppy.

Transfer the two invisible system files to the hard disk with

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SYS C: and restore COMMAND.COM using COPY. Then try rebooting. If this doesn't work, it might be because the system doesn't recognize DOS as bootable. Run the *Mace* or *Norton* nondestructive equivalent of DOS's FDISK to set the status of your DOS partition to bootable. If you still can't boot, try running *Mace*'s or *Norton*'s unformat utility to try to rebuild your FAT and root directory.

If you give your hard disk regular attention, you may never encounter the problems listed here. Otherwise, consider yourself lucky if you never have to use that backup you make every night before going home (right?). Buy a hard disk utility package —and get acquainted with it before disaster strikes. —*Nancy Canning*

USER GROUP TIPS

Helpful hints from members of the nation's user groups

COMPare DOS File Copies

When you use the DOS COPY command to copy a file from one disk to another, DOS flashes the message '1 file(s) copied'. But that doesn't necessarily mean that the new file matches the original. Using the VERIFY ON command in your AUTOEXEC.BAT file or adding the \V switch to a COPY command checks the version COPY stores in RAM against the new copy on disk. Even then, however, there's still a chance the copy isn't accurate.

To make sure a copy's exact, use the COMP command (or FC in MS-DOS) to compare the original against the copy. If COMP is in a directory listed in your PATH command, you can simply type COMP and then press <F3><Enter> right after COPYing to make the comparison.

Gordon White
Houston Area League of PC Users

Quick dBASE Duplicates

When working in *dBASE III Plus*, it's often necessary to create a record that duplicates several fields in an existing record. To avoid excess work, you usually copy the record and edit the duplicate as desired. Otherwise, you're stuck using *dBASE*'s unwieldy duplication command, SET CARRY ON.

Here's a simple program, DUPREC.PRG, that uses a single function key to duplicate records:

```
SET TALK OFF
ERASE Temp.dbf
COPY next 1 to temp
APPEND from temp
? "RECORD DUPLICATED"
SET TALK ON
```

Include the following line in your CONFIG.DB file:

```
F2="Do C:\db\Duprec;"
```

Now, all you need to do to duplicate the current record is press <F2>. The message 'RECORD DUPLICATED' will flash on screen to confirm that the job is done.

Musawwir Speigel
Sacramento PC Users Group

Making Moves With DOS

Some disk management utilities move files easily from one subdirectory to another, but DOS lacks a single command for this function. You can use a short batch file that teams the COPY, DEL, and COMP commands to move and verify your files. At the DOS prompt, enter the following lines:

```
COPY CON move.bat
COPY %1 %2
COMP %1 %2
PAUSE: If files DO NOT compare ok,
   press <Ctrl>-<C> & terminate
   batch job
DEL %1
```

Now, press **<Ctrl>-Z** (or <F6>) and then **<Enter>** to save MOVE.BAT. Move MOVE.BAT to any subdirectory listed in your system's PATH command.

MOVE.BAT in effect creates a MOVE command for DOS. To use it, type MOVE followed by the source file name and its destination (with or without a new file name).

MOVE.BAT pauses before deleting the original file, flashes a message telling you how well the original file and copy compare, and asks if you want to compare another file. Press <N>, and if the copy was successful, press any key to continue. If the status message shows any discrepancy between the files, press <Ctrl>-C to terminate the batch file and try again.

J. Pat Geis, SIG Director
IBM PC User Group of the Redwoods

Chip in! If you're a member of a user group and have tips to share, send them to PC World. *We pay $25 for each published tip. Or if you have a business problem that requires a PC solution, get in touch with our experts. See How to Contact PC World, page 4.* ●

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CONSUMER WATCH

Advice and information for the computer consumer

What do you do when a company refuses to resolve your complaint? Here's a report on arbitration and its increasing popularity for resolving business computer disputes.

Anita Amirrezvani

Falling Between the Cracks

It's an ironic situation. An unresolved business dispute can be too costly to write off as a loss, yet not worth the expense of a full-scale court battle. Disputes ranging from $10,000 to $100,000 often fall into this category—and represent a serious setback for cost-conscious companies.

Fortunately, businesses can initiate another method of dispute resolution: arbitration. Two prominent nonprofit organizations—the American Arbitration Association (AAA) and the Better Business Bureau (BBB)—offer arbitration services as an alternative to going to court. The AAA tends to take big-ticket commercial cases, while most Better Business Bureau branch offices are oriented toward smaller consumer disputes.

With the courts booked years in advance and attorney fees skyrocketing, arbitration is becoming increasingly popular, especially in the computer industry, according to AAA president Robert Coulson. "Arbitration is private, so dirty laundry doesn't have to get washed in public," says Coulson. "Also, it's cost effective and final."

The AAA and the BBB follow similar arbitration procedures: At the request of one of the parties involved in a dispute, the organization issues a list of possible arbitrators—impartial professionals who have agreed to participate in a case. Each party to the dispute can then request specific arbitrators. The AAA pays arbitrators a per diem fee, unlike the BBB, which relies on trained community volunteers.

Depending on a case's size and complexity, from one to three arbitrators are selected. Then the parties present their arguments at a scheduled hearing. (In business-to-business cases, lawyers may be present.)

Once both parties have been heard, the arbitrator considers the evidence and issues a decision, usually within a specified time. The AAA charges the participants a fee depending on the amount in question, for example, 2 percent for cases under $25,000. The BBB's consumer services, meanwhile, are free. With both organizations, arbitration is legally binding, and typically there is no appeals process.

Although details of the arbitration proceedings themselves are usually confidential, a recently publicized multimillion-dollar case between IBM and Fujitsu offered some insight into arbitration's benefits. Back in 1982, IBM alleged that Fujitsu's operating system software violated IBM's copyrights. After early attempts at negotiation failed, two AAA arbitrators decided in 1988 that Fujitsu owed IBM more than $833 million in licensing and access fees, of which $237 million was outstanding.

Here the benefits of arbitration seem obvious. Unlike a typical jury, the expert arbitrators —a Stanford law professor and a computer systems professional— were able to understand and settle complex computer issues, which included developing a working definition of software compatibility.

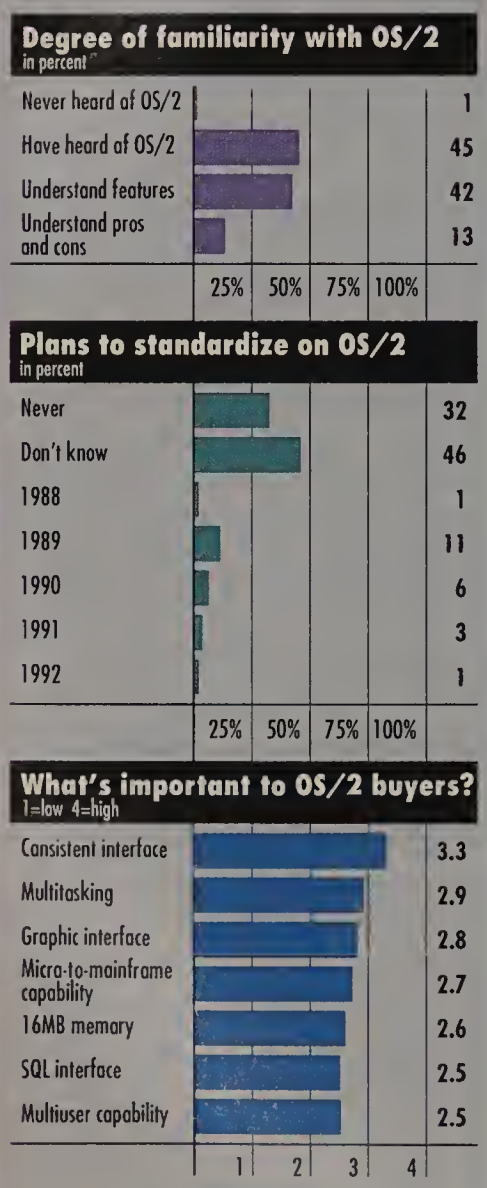
The confidentiality of the hearing itself, impossible in a public court of law, allowed IBM and Fujitsu to maintain the secrecy of their operations and their programming code. Final-

(continues)

RATE YOUR SATISFACTION: OS/2

How satisfied are users with OS/2? Right now it's too soon to tell. But when asked at what point they plan to standardize on OS/2, almost one-third of survey respondents said never. Forty-six percent said they didn't know. Both the high cost of hardware to run OS/2 and the lack of exceptional new applications are inhibiting buyers.

But the Presentation Manager may change all that. OS/2's most important feature, according to survey respondents, is its consistent user interface, not multitasking. PC users of the future can take heart; meanwhile, Macintosh developers are still laughing all the way to the bank.



Source: International Data Corporation. From a survey conducted in August 1988 of 188 sites, each with at least 50 PCs. Percent totals don't always equal 100 due to rounding.

ly, the procedure was undoubtedly quicker and cheaper than going to court.

A Quick Fix for Business Computer Complaints

In January, the Better Business Bureau of Eastern Philadelphia initiated a special program called Computercare. According to Frank Dressler, president and CEO of the Eastern Philadelphia BBB, the program is aimed at resolving business-to-business disputes in the $20,000-to-$100,000 range in which computer systems don't perform as expected.

Computercare is a joint venture of the BBB and Weinberg Associates, a computer consulting company. Chairman Sandy Weinberg describes his company's services as a combination of diagnostics and mediation.

Here's how it works. The injured party lodges a complaint with the BBB along with a $200 filing fee. Then a representative of Weinberg Associates meets with the complainant to assess the problem, identify which parties should be involved in mediation, and estimate fees. Fact finding and mediation cost $1000 per day plus expenses.

Once all the parties agree to the process, a fact-finding team determines what the technical problems are and who is at fault. The mediator then attempts to negotiate a settlement; if that doesn't work, the problem goes to binding arbitration.

Weinberg estimates typical fees at $2000 to $5000 for cases between $50,000 and $100,000. "The alternative is legal action, which is time-consuming and costly," says Weinberg. "Juries often don't understand computer problems and don't have the expertise to solve them. Also, we can provide what both sides of the dispute really want—a functioning solution."

FOR MORE INFORMATION

American Arbitration Association
140 W. 51st St.
New York, NY 10020
212/484-4000

Better Business Bureau of Eastern Pennsylvania
1930 Chestnut St.
Philadelphia, PA 19103
215/496-1007

Council of Better Business Bureaus
4200 Wilson Blvd. #800
Arlington, VA 22203
703/276-0100

SHOP TALK

Good Systems, Bad Service

In August 1988, *PC World* reviewed an AT clone provided by Micro 1 in San Francisco and rated it excellent in overall value. In the November issue, Micro 1's Tower 386-20MHz was also recommended as a good deal. Unfortunately, *Consumer Watch* has received seven complaints about Micro 1 since then, including charges of nondelivery, delays in issuing refunds, and unresponsiveness. At press time most of the complaints had been satisfactorily resolved.

The San Francisco Better Business Bureau reported that it also had received a "significant number" of complaints about Micro 1, mostly about refund delays. According to the BBB, Micro 1 has been providing refunds, but the delays have left some consumers dissatisfied.

In a letter to *Consumer Watch*, Micro 1 president Rick McCabe explains, "Due to a se-

(continues)

Aw . . . What the Heck!

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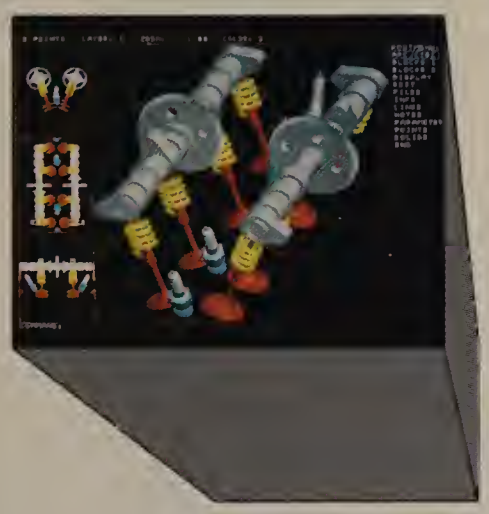

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Just because DesignCAD 3-D is powerful doesn't mean it is difficult to use. Single keystroke commands and side-bar menus which give short directions on how to proceed make DesignCAD 3-D a snap to use! While not required, DesignCAD 3-D supports all popular digitizers and mice.

Many of the older, more cumbersome CAD systems require weeks of training before a user can be productive. DesignCAD 3-D users find they can be producing useful drawings in a matter of minutes! In a recent CAD contest only one contestant was able to match our drawing time. The package sold for $3000.00. The other CAD packages took up to twice as long to perform the same drawing and cost up to $5000.00!

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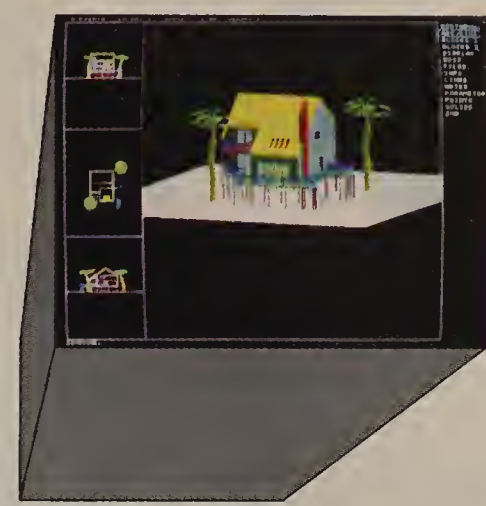

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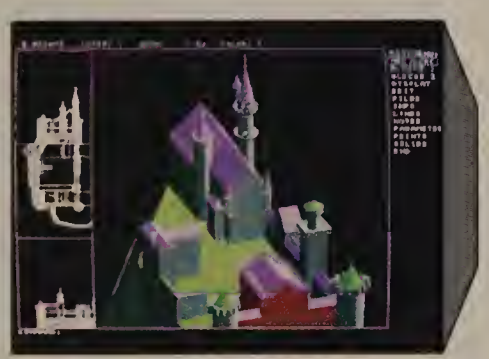

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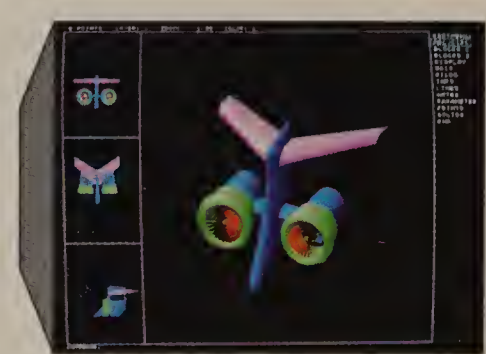

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J. TURNER, Architect, TAO Ltd. - The Woodlands, Texas

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DR. STEVENS, NASA Space Scientist/Engineer

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ries of excellent magazine reviews and a very favorable response at COMDEX, Micro 1 experienced an unprecedented volume of business. We developed a slight back order, and several orders were delayed. We also experienced delays with our 12-MHz machines because the last batch of 12-MHz motherboards we received were not compatible with our standard 1:1 interleave controller. We were therefore on hold until the vendor could rectify the problem."

Check With the Factory First

An authorized Epson dealer recently sold me an Equity 286 computer installed with a 40MB hard drive, and an 8-bit hard drive controller instead of a 16-bit controller.

I discovered this by accident a few weeks after I bought the computer. When I confronted the store manager, he admitted the unsuitability of the 8-bit controller but declared he was required to use it to stay competitive. He suggested that a 16-bit controller could be installed for an additional $124. When I asked for a refund, he insisted on a 15 percent restocking fee, which would amount to about $240.

My next avenue was to appeal to the manufacturer. Epson agreed that the installation was incorrect and said that their factory-installed units use a 16-bit controller. They were solicitous, but that was all.

Frederick L. Brash
Countryside, Illinois

Editor's note: Consumer Watch *forwarded Mr. Brash's complaint to Epson. In a phone interview, an Epson spokesperson said the dealer had been asked to replace the controller for free. The spokesperson also confirmed that Epson's factory-installed units ship with a 16-bit controller but emphasized that the dealer had not violated any Epson policies by installing an 8-bit unit.*

Mr. Brash's example illustrates that it's a good idea to cross-check the specifications of a factory-installed PC before purchasing a unit locally.

Slow Support at Video Seven

The October 1988 issue of *PC World* ran a news brief on the V-RAM VGA graphics board by Video Seven. After buying the board, I wasn't able to install it. I wrote to Video Seven, and after waiting one month for an answer, I attempted without success to contact them using their 800 number. The only time Video Seven returned a call was after I left a message stating that I wanted my money refunded. Unfortunately, I wasn't the one who answered their call, and I wasn't able to reach them when I called back.

Next I sent a certified letter to Video Seven, but I still didn't receive a response. Video Seven claims a five-year warranty; at this rate it will be five years before I get an answer.

James S. Yablonsky
Liberty Borough, Pennsylvania

We have purchased several Video Seven Vega VGA boards. At first we were quite pleased with the hardware. The story changed, however, when we discovered bugs and tried for over four months to get drivers for

(continues)

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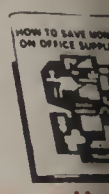

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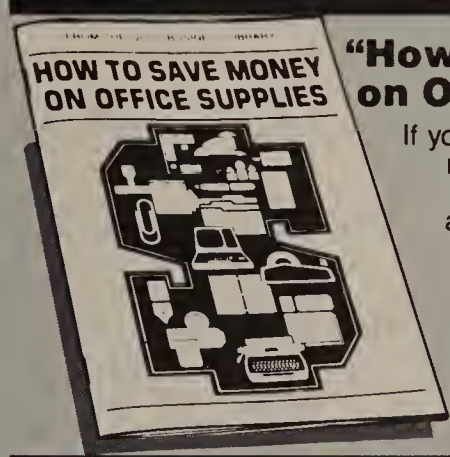

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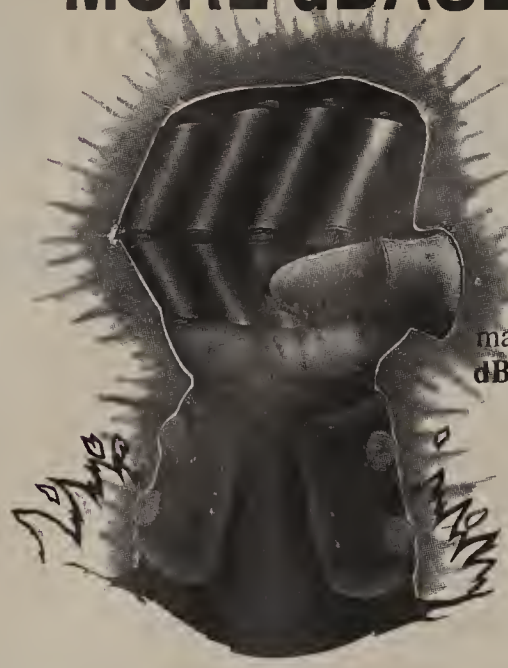

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Circle 311 on reader service card

Windows/386. We can't get the color brown on our monitors, *Microsoft Flight Simulator* does not work at all, and programs that use EGA video memory produce garbled results.

Today I completed my 20th call to Video Seven. When I phone the technical support line, I reach an answering machine. It seems that our only recourse is to swallow the cost of these cards and purchase others from another company.

Zacharias Beckman
Iowa City, Iowa

Video Seven responds: Both Mr. Yablonsky and Mr. Beckman have been satisfied, and both have a good point. It has been very difficult to get through to our technical support department. Sales have increased substantially over the past year, and this success has put stress on that group. It takes time to hire and train new representatives; it's no help to anyone to put people on the phone who aren't prepared to help the customer.

I have tripled the size of the tech-support group over the past year and plan to add still more personnel. I would like to apologize to anyone inconvenienced during this period.

Greg Reznick
Vice President, Marketing

To send correspondence or to submit material for publication in this column, please see How To Contact PC World, page 4. ●

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Here's What The Critics Are Saying About ViewLink...

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Jeff Angus, INFOWORLD –Feb. 6, '89

"In a computer market that's overflowing with "me-too" products, ViewLink is potentially one of the most important products to appear in the past year."
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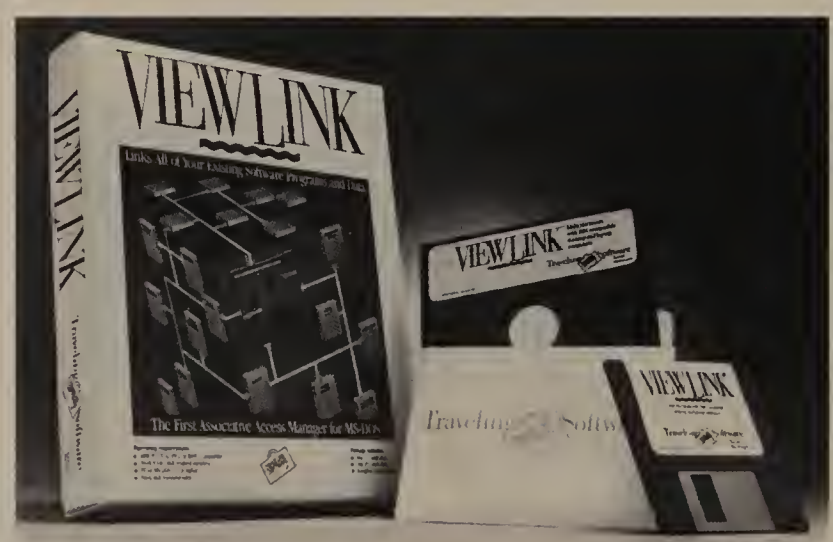

"ViewLink provides a welcome new way of managing applications."
Jimmy Guterman, PC WEEK –Jan. 30, '89

"What a great idea... ViewLink is an idea that's long overdue for any DOS computer."
Don Crabb, CHICAGO-SUN TIMES–Feb. 19, '89

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Jeffrey Tarter, SOFT•LETTER

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THE HELP SCREEN

PC World offers answers and advice at every level

Why you shouldn't format 720K disks to 1.44MB, associating with the DOS 4.0 shell, understanding CHKDSK, and how to upgrade 8086-based PCs.

Karl Koessel

Twice the Storage, Half the Confidence

Q. *I have found I can use a 1.44MB drive to format a 720K (double-density) 3½-inch floppy disk to 1.44MB. Although sometimes FORMAT takes a few tries to complete the process, I have not had any problem reading data stored on such disks, and double-density disks are substantially less expensive than the high-density variety. Am I running any risk by doing this?*

Charles Douglas Knechtel
Seattle, Washington

A. Yes. Both 3½- and 5¼-inch double-density disks have a different magnetic coating than their high-density cousins. The high-density coating is designed to accommodate the weaker magnetic field that high-density drives use when writing the denser format (see "The Medium Is the Mess," *The Help Screen, PCW,* December 1988).

Because double-density disks are not made to hold this weaker signal, they usually contain a large number of bad sectors. (The repeated attempts to format those sectors, which won't hold data, is why the process sometimes takes so long.) Although the drive won't use those bad sectors, it will use sectors that are only marginally better. Those marginal sectors will go bad a lot sooner than they would if they held a stronger signal. And there's the risk—when such a sector goes bad, you may not be able to recover the rest of the file to which it belongs. Except as an intermediary for transferring files, a high-density format on double-density media is a false economy.

Associate With DOS 4.0

Q. *"DOS Lives!" [*PCW, *October 1988] described a feature of the DOS 4.0 File System that I can't use: the ability to associate files. According to the article, if a data file is associated with a particular program, you can simply highlight the data file's name and press <Enter> to automatically exit the DOS shell, run the associated application, and open the specified data file. It sounds great, but I can't do it.*

After pressing <Tab> to move the selection cursor from the File System's Directory Tree into the Filename Area, I can use the cursor keys to highlight the name of a program (the first step in associating). But when I go to the Action Bar and open the File pulldown menu, the Associate item is unavailable—the A *in* Associate *is replaced by an asterisk, and trying to execute the command just produces a beep. I'm working with an IBM XT 286 with a monochrome graphics (Hercules-compatible) monitor.*

Jim Laidlaw
Little Rock, Arkansas

A. Because DOS 4.0 does not directly support Hercules graphics, its Select program installed the DOS shell program in text mode. (Adding the parameter /TEXT to the @SHELLC command of DOSSHELL.BAT will force a graphics-based system into text mode.) Although similar in layout, the DOS shell's text-mode interface and its graphics-mode counterpart differ in a number of ways. For example, in graphics mode an icon appears to the left of each file name. When moving through the list of file names with the cursor

(continues)

ANTHONY RUSSO

keys, the user of the graphics-mode interface sees that the icons are not highlighted, suggesting that there's one more step to selecting a file name. In text mode, however, no icon is visible.

In either mode, mouse users simply click on the file name instead of using the cursor keys. In graphics mode, the icon is then highlighted; in text mode, a triangle called the selection symbol appears in the empty space to the left of the highlighted file entry. Click on the file name again, and the icon or selection symbol toggles off.

To select a file name without a mouse, simply cursor to the file name and press the <Space> bar. When the selection symbol or highlighted icon is present, you can select the Associate item from the File menu. In fact, you can select several file names and choose an action for them all: Just cursor to the first file name, press the <Space> bar to tag it, move on to your next choice, press the <Space> bar to tag it, and so on.

Note, however, that Associate is meant only for programs that can accept a data file name as a command-line parameter. For example, most word processors can load a document automatically when you start the program; to load a document called SALES-.RPT into *WordPerfect*, you would simply enter WP SALES-.RPT at the DOS prompt. "DOS Lives" should have said that .SET files (not worksheets) can be associated with *1-2-3*.

Understanding CHKDSK

Q. *I regularly use the CHKDSK command to check my hard disk, but I'm not sure what to do when it turns up a problem. On rare occasions I have received the message* 'x *lost clusters found in* y *chains.' If I then run CHKDSK /F, I'm left with* y *FILE*xxxx*.CHK files in the root directory. These files usually contain little that I recognize, and I have no idea how to make them usable. As a result, I generally just erase them, which would seem to defeat the purpose of creating them.*

How can I make better use of CHKDSK?

Alan R. Schwartz
Brattleboro, Vermont

A. First let's review the basics of DOS's disk structure. FORMAT divides the disk into allocation units called clusters and builds the file allocation table (FAT). The FAT contains a code for each cluster indicating whether that cluster is available, in use, or bad (not to be used because it can't reliably record data). FORMAT also reserves disk space for the root directory.

When you save or copy a file onto the disk, DOS scans the FAT until it finds the code indicating an available cluster. Then the file (or as much as will fit) is written into that cluster, and that cluster's FAT entry is changed to indicate that the cluster is in use. The process is repeated if the file is larger than a single cluster. If, for example, a file begins in the third cluster, then the third entry in the FAT will contain a code indicating either the third cluster is the file's last, or the number of the cluster holding the next part of the file.

Finally, DOS places an entry in the directory. That entry contains the file's name and extension, the date and time the file was saved, its size, and so on. It also includes the number of the file's first, or starting, cluster. In this manner, the FAT tracks cluster use and "chains" together a file's clusters.

As you've found out, sometimes a chain of clusters can get lost. Because no directory entry points to the start of the chain, DOS can't access the chain or make the clusters available for new data. This often happens when the user turns off the PC or reboots without first exiting an application properly, which prevents it from closing a data file and updating the directory.

When you issue CHKDSK /F to recover lost clusters and respond with a Y to the prompt that asks if they should be converted to files, CHKDSK creates directory entries (FILE*xxxx* .CHK) in the root directory that point to the beginning of each lost chain. If you instead answer with an N, it won't create .CHK files, but sets the lost clusters' FAT entries to zero, which frees the clusters for use. In other words, answering N has the same effect as creating and then erasing the .CHK files. A .CHK file containing part of a program, graphic image, or spreadsheet file is generally unrecognizable and unusable, but sometimes you'll find lost data base records or portions of that epic you've been writing.

CHKDSK will also uncover cross-linked files. Two files are cross-linked when the FAT says they have a cluster in common, which is never correct. It could be that one file's FAT entry should indicate the end of that file but instead points erroneously to a cluster used by the other file. Or perhaps the FAT

(continues)

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entry that links one file to the other is wrong and should instead point to a different cluster, which is now orphaned (because its FAT entry marks it as used but no FAT or directory entry points to it).

If CHKDSK uncovers files with cross-linked clusters, use the COPY command to make duplicate files with new names and then erase the cross-linked files. Check each of the new files and fix what you can. Remember to check any FILE*xxxx*.CHK files; they may hold portions missing from the cross-linked files.

CHKSDK will also inform you about other directory- and FAT-related disk problems. If you use the /F parameter, CHKDSK usually takes appropriate action; on rare occasions, you'll be required to make the fix. Hopefully, you'll never have a problem like CHKDSK being unable to read or write the FAT (or its duplicate). Such a problem stops CHKDSK cold and is the province of disk recovery utilities (see "Recovering From Hard Disk Disaster" in this issue).

Besides discovering the amount of free RAM and disk space, CHKDSK can also check whether a file is contiguous; just follow CHKDSK with the name of the file (the wild-card characters * and ? may be used). A noncontiguous, or fragmented, file can degrade system performance because moving the drive head back and forth across the disk to read the scattered parts of a fragmented file takes longer than reading a contiguous file of the same size. With floppy disks, all you do to make files contiguous is copy them onto another disk. The only painless way to make your hard disk files contiguous is to use a disk optimizer program.

Another use of CHKDSK is to list the names of all the files on a hard disk, with each file name preceded by its directory. Although the DOS command TREE /F generates a similar listing, CHKDSK /V omits empty directories, prefixes every file name with its path, and generates a more compact listing. To list only those files and directories that contain a particular string of characters, you can pipe CHKDSK /V's output to the DOS FIND filter (for example, CHKDSK /V ¦ FIND ".BAK"). However, this method takes longer than using a utility dedicated to the task (see "A Turbo Pascal File Finder," *PCW*, April 1989).

Feeling 86'ed

Q. *Your "Buyers' Guide: EMS 4.0 Memory Boards" [*PCW, *January 1989], like so many other articles, covers converting and upgrading* 8088-*based systems. I have two 8086-based Compaq Deskpros, each equipped with 640K of memory, two 360K floppy drives, and a 20MB hard disk.*

Both systems are in excellent shape, though they are not worth much in today's used market when compared with what I paid just three years ago. They'll never equal the performance of my newer AST 386, but if they could be upgraded cheaply, I think they could still be quite useful. Is there anything special involved in upgrading 8086-based systems as opposed to 8088-based PCs?

H. E. Hauschild
Redmond, Virginia

(continues)

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A. Upgrading an 8086-based clone is not much different from upgrading an 8088-based PC. Your Deskpros and all other 8086 PC clones will accept any PC expansion cards except accelerator cards designed to plug into an 8088 processor socket. That means they'll also accept any floppy, hard, or tape drives made for the PC. Note, however, that older 8086-based clones, just like older 8088 systems, may require a ROM upgrade to support newer disk drives and formats, such as the 1.44MB 3½-inch floppy disk drive. The same holds true for display adapters.

To send correspondence or to submit material for publication in this column, please see How to Contact PC World, page 4. ●

POWER TIP NO. 51

Backing Up Is Easy to Do

Many backup systems don't let you back up just one directory but require you to back up your entire hard disk. To simplify backup, instead of creating one volume on your disk, create two separate volumes: one for applications and the other for data. Back up the applications and data volumes separately. From then on, you need to back up only the data volume (except, of course, after adding a new application).

Robert Luhn
Senior Editor

How Farsighted Executives Are Using Their PC's For The Fun Of Profit.

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By William J. Spink

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"One of Dow Jones News/Retrieval's services, QuickSearch, is a Godsend," adds Jim Posner, a respected retail consultant. "It gives me detailed corporate reports within minutes—I don't even have to leave the office."

Instant information: the executive advantage.

To lead in today's marketplace, you need information like *that*," Lynch says, snapping his fingers.

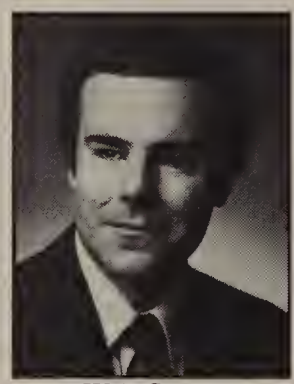
He recalls an example of how Dow Jones News/Retrieval®—the business and financial information service from Dow Jones & Company, Inc.—gave JCPenney Company a real advantage.

"Let's just say that a 'major player' in our industry was being acquired. Within a few hours we knew more about the takeover candidate than the bidder did. Honestly, we knew more than some investment bankers did.

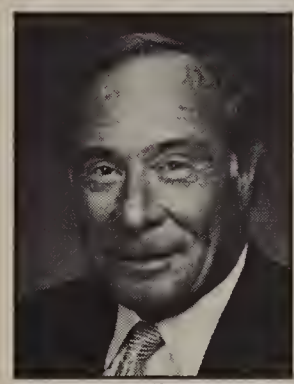
Decision-making with the leading edge.

"Then we started getting the corporate insider trading data," Lynch continues. "It showed us some things that influenced a major deal.

Al Lynch
Director of Planning and Research, JCPenney Co.



Walt Casey
Vice President Corp. Communications, ConAgra, Inc.



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Making the right decision.

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"It was apparent from the first step that the most useful system was Dow Jones News/Retrieval," remembers Casey. "It offers so much of the information you're looking for—from general news and stock quotes, to data on our company and industry. It was the best single source."

"I've had other services, but Dow Jones News/Retrieval has the most useful business information in the right form," says Posner. "The time I spend 'playing' on the computer makes more money for me—and for my clients."

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New UL 1449 Guide to Surge Protection Provides First Objective Standards

UL 1449: The New Watchdog

Until recently, there was no standard to go by in selecting a surge protector. Consumers had to make choices based on little-understood technical specifications that had nothing to do with the performance of a surge protector.

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Earlier studies by the Institute of Electrical and Electronics Engineers (IEEE) have shown that the average office or household receives approximately 100 power surges or "spikes" each month, many as high as 1,000 volts.

Such surges occur whenever power output is "dirty," or not constant. Common sources of power surges in the AC power supply result from nearby lightning strikes, utility companies changing power loads, on-off switching of inductive motors and self-switching power supplies such as air conditioners, refrigerators and dishwashers. If your electronic equipment remains unprotected, these surges can cause irreparable damage to expensive electronics such as computers, TV's, VCR's, stereos and FAX machines. In computers, they can also cause disruption or total loss of valuable data.

Surge protectors act by "clamping" the moment a surge occurs, thereby controlling the amount of voltage that will pass through to your expensive systems or appliances.

UL 1449 and You: Choosing the Right Surge Protector

UL 1449 is a mandatory test for all surge protector manufacturers desiring the UL 1449 listing. A UL 1449 rating of 400 Volts Peak or less assures consumers that the final voltage going through their equipment is at a safe, clean level. Therefore, a surge protector with a UL 1449 rating of 400 Volts Peak offers superior protection to that of another surge protector with a UL 1449 rating of 500 Volts Peak or more.

Protection Features to Consider When Buying or Specifying Surge Protectors:

- UL 1449 "Most Protection: Rating of no more than 400 Volts Peak."
- Hot to Neutral, Hot to Ground and Neutral to Ground Protection (which protects all incoming lines to your equipment).
- EMI/RFI Filtering—for protection against many electrical and radio frequency interferences.
- Telephone/FAX/Modem Protection—for protection of today's highly sophisticated electronic equipment which requires use of a standard telephone line.
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Underwriters Laboratories has developed this chart to show the maximum voltage that can pass through a surge suppressor after clamping has occurred.

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Learn a fresh function for DATE and TIME, use C to fix a fouled cursor, redirect Pascal output, guard against viral attacks, pack commands into a pipe, make quick calculations from DOS, and put a programmer's references on line with CD ROM.

Edited by Tom Swan

Booting Around the Clock

"If You've Got the Time" [*The Help Screen, PCW,* December 1988] suggests removing the DATE and TIME commands from AUTOEXEC.BAT on systems with an on-board clock. While this eliminates the need to press <Enter> at boot time, it doesn't let you verify whether your clock is working, which it might not be if the battery runs down! When this happened to me, I noticed the problem only later, after inspecting new file dates in a directory listing. Then I found a hands-off way to use the DATE and TIME commands.

First, create a file containing a single blank line and name it ENTER: At the DOS prompt, type **COPY CON ENTER<Enter><Enter><Ctrl>-Z<Enter>**. Store the file in your boot disk's root directory, and change the DATE and TIME commands in AUTOEXEC.BAT to:

```
ECHO OFF
DATE <ENTER
ECHO EC[1AEC[KEC[1A
TIME <ENTER
ECHO EC[1AEC[KEC[1A
```

The symbol E^C in the ECHO commands represents the Escape character (ASCII 27). With some word processors—*Microsoft Word,* for example—the Escape character can be entered by holding down the <Alt> key while typing 27 on the numeric keypad. [Most word processors do not allow you to enter the Escape character directly from the keyboard; see the editor's note that follows.] The <ENTER after DATE and after TIME automatically passes the contents of the ENTER file, which consists of nothing more than a carriage return, to those commands. The ECHO lines issue ANSI.SYS commands that erase the messages beginning 'Enter new…'. Together, the batch commands cleanly display the date and time—and you never have to touch a key.

Bob Farland
Hampton, Virginia

Editor's note: WordPerfect *users can press <Ctrl>-V and then <Esc> to enter an Escape;* WordStar *users type <Ctrl>-P followed by the left square bracket ([). If your word processor or editor doesn't provide a way to enter an Escape, you can use EDLIN from your DOS disk. In EDLIN, the Escape character is entered by pressing <Ctrl>-V followed by the left square bracket.*

Note that the A's and K's in the ECHO commands must be uppercase and that the ANSI-.SYS driver must be loaded at start-up.

If you boot from a floppy, it should contain the ANSI.SYS file from your DOS disk and a CONFIG.SYS file that includes the line DEVICE = ANSI.SYS. If you boot from a hard disk, ANSI.SYS can be in any directory as long as the CONFIG.SYS file's DEVICE command includes the appropriate path. For example, with ANSI.SYS in the \DOS directory, you would use DEVICE = \DOS\ANSI.SYS.

Cursors—Foiled Again

On my system, switching between *Microsoft QuickC* and the stand-alone *M* editor leaves the cursor hanging in midair.

(continues)

ANTHONY RUSSO

```
#include <stdio.h>
#include <dos.h>
#define VIDEO_IO 0x10
#define SET_CURSOR_TYPE 01
union REGS regs;
main()
{
regs.h.ah = SET_CURSOR_TYPE;
regs.h.ch = 11;
regs.h.cl = 12;
int86( VIDEO_IO, &regs, &regs );
}
```

LISTING 1: RCURSOR.C resets the cursor to its default shape.

```
#include <stdio.h>
#include <dos.h>
#define VIDEO_IO 0x10
#define GET_CURSOR_TYPE 03
union REGS regs;
main()
{
regs.h.ah = GET_CURSOR_TYPE;
int86( VIDEO_IO, &regs, &regs );
printf( "Set ch to %u\n",
    regs.h.ch );
printf( "Set cl to %u\n",
    regs.h.cl );
return( 0 );
}
```

LISTING 2: CSTYLE.C lists the default cursor values to insert for ch and cl in RCURSOR.C.

RCURSOR.C [see **LISTING 1**] restores the cursor to its normal shape—a blinking underline—with a call to a BIOS video routine. After compiling, store RCURSOR.EXE in a directory listed in your system's PATH and enter RCURSOR to stabilize the cursor before switching editors.

Eric Martin
Hendersonville, Tennessee

Editor's note: Although I don't have the same difficulty with QuickC *and* M *on my system, a misshaped cursor is a common bug. The problem usually occurs when a program changes the original cursor and fails to restore it—an oversight that RCURSOR handily fixes. Before compiling the program, run CSTYLE.C* (**LISTING 2**) *to find the correct settings for your default cursor, and replace the 11 and 12 in RCURSOR with the values that CSTYLE.C lists for* ch *and* cl.

```
program RedirectOutput;
{ by Stephen Piatak }
uses CRT;
type  Str64 = string[64];
var   filename : Str64;

procedure RestoreCRT;
begin
   close( output );
   AssignCRT( output );
   rewrite( output )
end; { RestoreCRT }

procedure
RedirectOut( filename : Str64 );
begin
   close( output );
   assign( output, filename );
   rewrite( output )
end; { RedirectOut }

begin
   writeln( 'This is onscreen' );
   RedirectOut( 'LPT1' );
   writeln( 'This is printed' );
   RestoreCRT;
   writeln( 'Back to the screen' )
end.
```

LISTING 3: REDIRECT.PAS shows how to redirect Turbo Pascal output to the display and printer.

Pascal Redirections

After reading Richard Baxter's "What You See Is What You Print" [*Star-Dot-Star, PCW,* November 1988], I wanted to share a similar *Turbo Pascal* routine of mine. REDIRECT.PAS [see **LISTING 3**] redirects output to a file or to the printer, just like the BASIC technique described in the original article.

Stephen Piatak
Moline, Illinois

Editor's note: REDIRECT requires Turbo Pascal 4.0 *or* 5.0. *To send output to a file or a device such as a printer, use the statement*
RedirectOut(filename *);*
where filename *is the name of the file or device—MYFILE.TXT or LPT1, for example. Call procedure RestoreCRT to route output back to the display.*

```
ECHO OFF
CLS
ECHO COMMAND.COM should be 25307
ECHO bytes. If it isn't, your PC
ECHO may have a virus infection.
DIR \COMMAND.COM
PAUSE
```

LISTING 4: Add these lines to AUTOEXEC.BAT and give your system a daily checkup for virus infections.

Diagnosing a Virus

With the recent surge in computer viruses, I decided to add some lines to my AUTOEXEC.BAT file to alert me to potential infections [see **LISTING 4**]. Some viruses attach themselves to COMMAND.COM, thus spreading to freshly formatted system disks, and these commands help you spot a change in file size—one of the first symptoms of a virus attack. Two cautions: Make sure you're using a virus-free COMMAND.COM copied from a DOS master disk, and remember to change the file size in the batch commands after upgrading to a new DOS version.

Thomas C. Nelson
Bedford, New York

(continues)

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ENTER OUR CRACKPOT ENGINEER. Our Crackpot Engineer wondered what was the difference between the disks. He tore them apart, analyzed the media. He found NO DIFFERENCE WHATSOEVER! Yet, they would not format. Why? Then he started examining the plastic housing. And he found the difference. It is NOT in the media, IT IS IN THE PLASTIC CASE!

TOTAL FAILURE! Our Crackpot Engineer (among other things, he invented the Electronic Flea Collar) sent a brand-new 720K disk to our machine shop, and asked them to modify it. They did... and the DISK IMMEDIATELY FORMATTED! But, within 10 minutes of use, it totally failed. It lost data all over the place. Back to the drawing board. The disk was dis-assembled and examined. It was found that, in performing the conversion, a microscopic piece of plastic had entered the housing, and totally ruined the disk. It was obvious that, if the conversion could be done reliably, it required extreme precision.

ENTER OUR OTHER CRACKPOT ENGINEER. Our president is a mechanical engineer. One of the best in the country. While a research scientist at Colorado School of Mines, he completely revolutionized the field of water jet drilling. He tackled the problem. Finally he came up with a solution - a precision tool which could perform the modification EVERY TIME and leave no plastic particles which would damage the disk!

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PC WORLD

```
ECHO CLS : PRINT "%1 ="; : PRINT %1 | BASICA
```

LISTING 5: This single-line batch file, CALC.BAT, lets you make simple calculations from the DOS command line.

Editor's note: From DOS, type **DIR \COMMAND.COM** *and replace the 25307 in* **LISTING 4**'*s ECHO command with the correct file size for your system. If the DIR in the batch commands returns the wrong file size, press <Ctrl>-C at the PAUSE. Then, reboot with a* write-protected *copy of a DOS master disk and, assuming the infected drive is C:, enter the commands* **SYS C:** *and* **COPY COMMAND.COM C:**. *If this doesn't get rid of the virus, you may have to reformat your disk and restore files from backups.*

Pipe Dreams

Contributor James Reynante shows how to run multiple DOS commands from within *Microsoft Word* ("DOS Sojourns," *Star-Dot-Star, PCW,* August 1988). Often, you can also string DOS commands together using a pipe (¦). For example, to change directories and run a program, issue <Esc> Library Run and enter CD\DIRECTORY ¦ PROGRAM.

Bob Brody
Los Angeles, California

Editor's note: You can use this tip in Microsoft Word, *from DOS, or at the 'Run DOS Command' prompt (in programs that have one). Just separate multiple commands with a vertical bar. For instance, to delete all .BAK files and list a directory to the printer, you can type DEL *.BAK ¦ DIR > PRN. The original suggestion of starting a new copy of COMMAND.COM is still a good one, however, as that method lets you stay in DOS until you issue the EXIT command.*

Command Line Calculator

Dave Bushong's tip ["BASIC Pipe Lines," *Star-Dot-Star, PCW,* December 1988] about using a DOS pipe to BASIC or GW BASIC for simple calculations is a delight. To make the process even easier, I created a single-line batch file named CALC.BAT [see **LISTING 5**]. Enter commands such as CALC 22/7, and the batch file clears the screen and neatly prints the answer.

David K. Kasai
Goleta, California

Corrections

The captions for FIGURES 1, 2, and 3 in last December's column are incorrect. They should read:

FIGURE 1: ADVANCES.DBF can be sorted on a field from EMPLOYEE.DBF via the common field EMPNO.

FIGURE 2: Use these dBASE commands to arrange the data from FIGURE 1 to produce the report in FIGURE 3.

FIGURE 3: The result of executing the commands in FIGURE 2.

DEVELOPER'S TOOLBOX

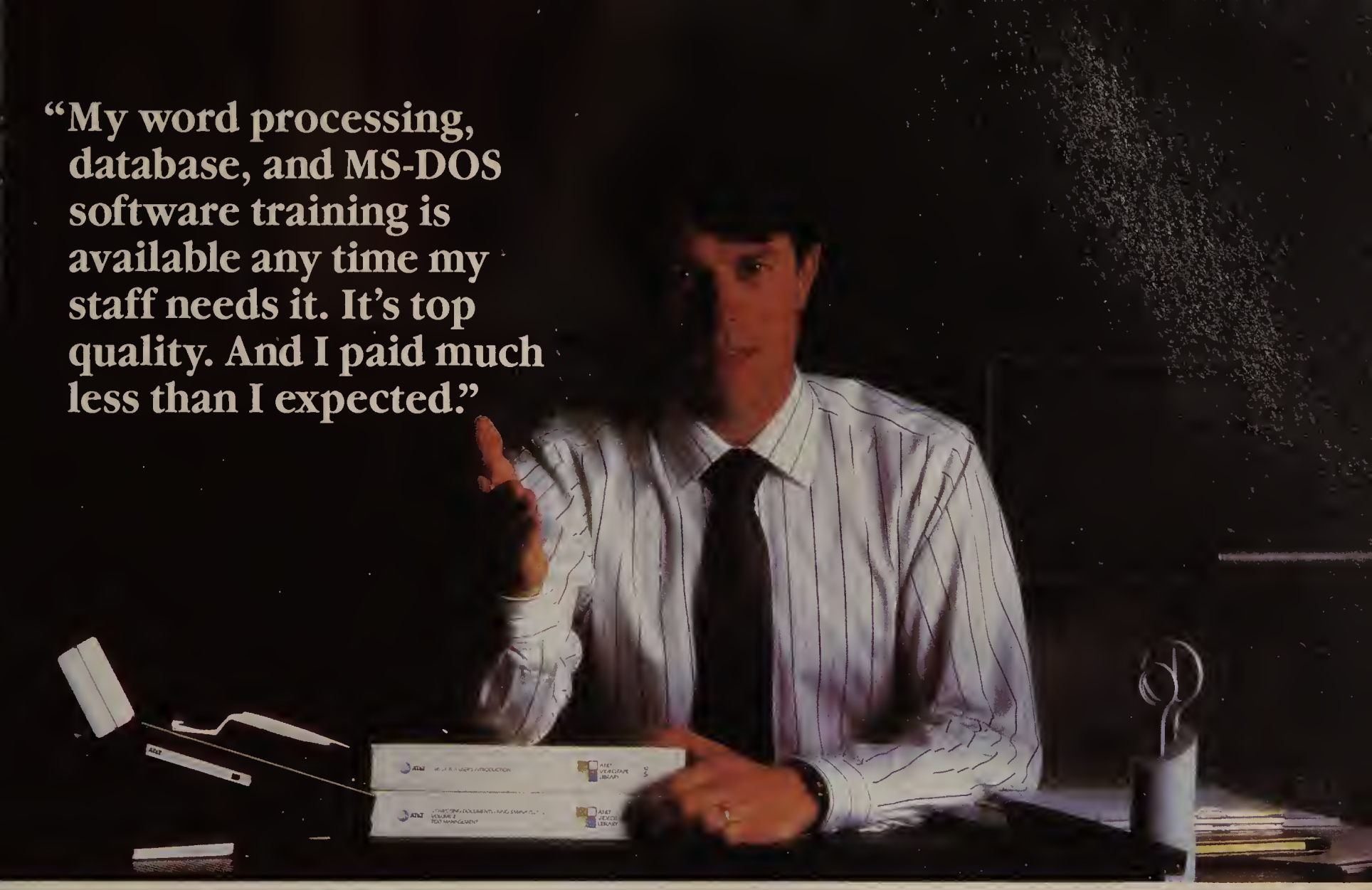
CD ROM to the Rescue

Every month I sweep off the desk and start pulling this column together. Before long I'm practically buried alive in avalanche-prone drifts of user manuals, notebooks, references, and printouts. A few months ago, while surfacing for air, my eye caught a rainbow-colored flash from a silver disk on a shelf far across the tundra. Oh yes, that's the new *Microsoft Programmer's Library (MSL)* CD ROM, I thought, before I burrowed back down into a heap of paper.

So, with fervent hopes of conquering my Everest of references, I acquired an Amdek Laserdrive-1, installed the *MSL* software (nothing to it), and plopped in the CD ROM disk. I should have done this months ago! Now I simply press <Alt>-<Left Shift>, and up pops a menu (optionally mouse-driven) ready to let me explore over 20,000 pages of indexed and cross-referenced technical information on *Microsoft C,* OS/2, *Windows, MASM,* MS-DOS, *BASIC, Pascal,* and *FORTRAN,* plus mouse and CD ROM interfaces. Among the 48 on-line tomes are the entire *MS-DOS Encyclopedia,* Ray Duncan's *Advanced MS-DOS,* Augie Hansen's *Proficient C,* and Richard Wilton's *Programmer's Guide to PC and PS/2 Video Systems.*

Let's put this into perspective. One CD ROM can hold 660MB of data—equivalent to about 300,000 double-spaced pages. If you were to start on

(continues)



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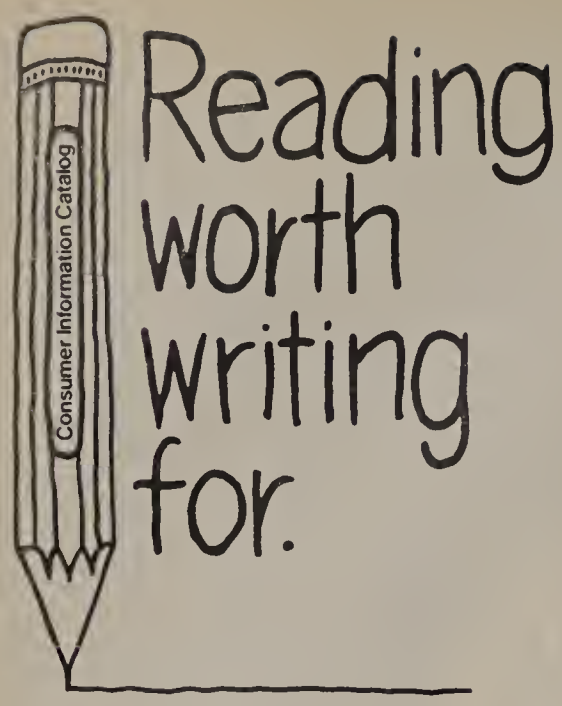

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New Year's Day reading a page every 30 seconds, 7 hours a day, you'd miss your Memorial Day picnic. If the disk were full, you'd miss your entire summer vacation. True, *MSL* doesn't fill every CD ROM byte, but there's still a *ton* of stuff on this little 4½-inch plastic disk.

Sifting through all this data is smoothly accomplished by the included *MSL* software—a masterstroke of simplicity and function. The program runs as a stand-alone application or in resident mode, taking about 135K of RAM—less 64K if you have a little expanded memory to spare. Although the commands are easy to use, performing searches efficiently takes practice. For example, asking for references to *keyboard* nets an overwhelming 330 citations. But asking for *keyboard interrupt* gleans just 4 items.

One *MSL* feature I adore is the ability to cut excerpts from over 7MB of sample code and paste them directly into my programs or save the data on disk. *MSL* supports most popular editors, including *Brief, Epsilon,* the *Microsoft Editor, Turbo C, Turbo Pascal, VEdit, Microsoft Word, WordPerfect,* and *WordStar.*

With so much information on line, I almost hate to leave the office. So I installed the remote-access *pcAnywhere III* on my PC there, which is connected by a serial cable to a Macintosh Plus running *PC MacTerm* in the living room. With this software combo, I can now access *MSL* at any time—even on the Mac. Although windows pop up a bit slowly at 9600 bps, response time is quite acceptable. Best of all, having 200,000 pages on line sure beats a mountain of books and paper toppling onto the floor.

Feel free to write to me about this or any other subject. My MCI Mail and BIX handle is TSWAN; my CompuServe ID is 73627,3241. —*T. S.*

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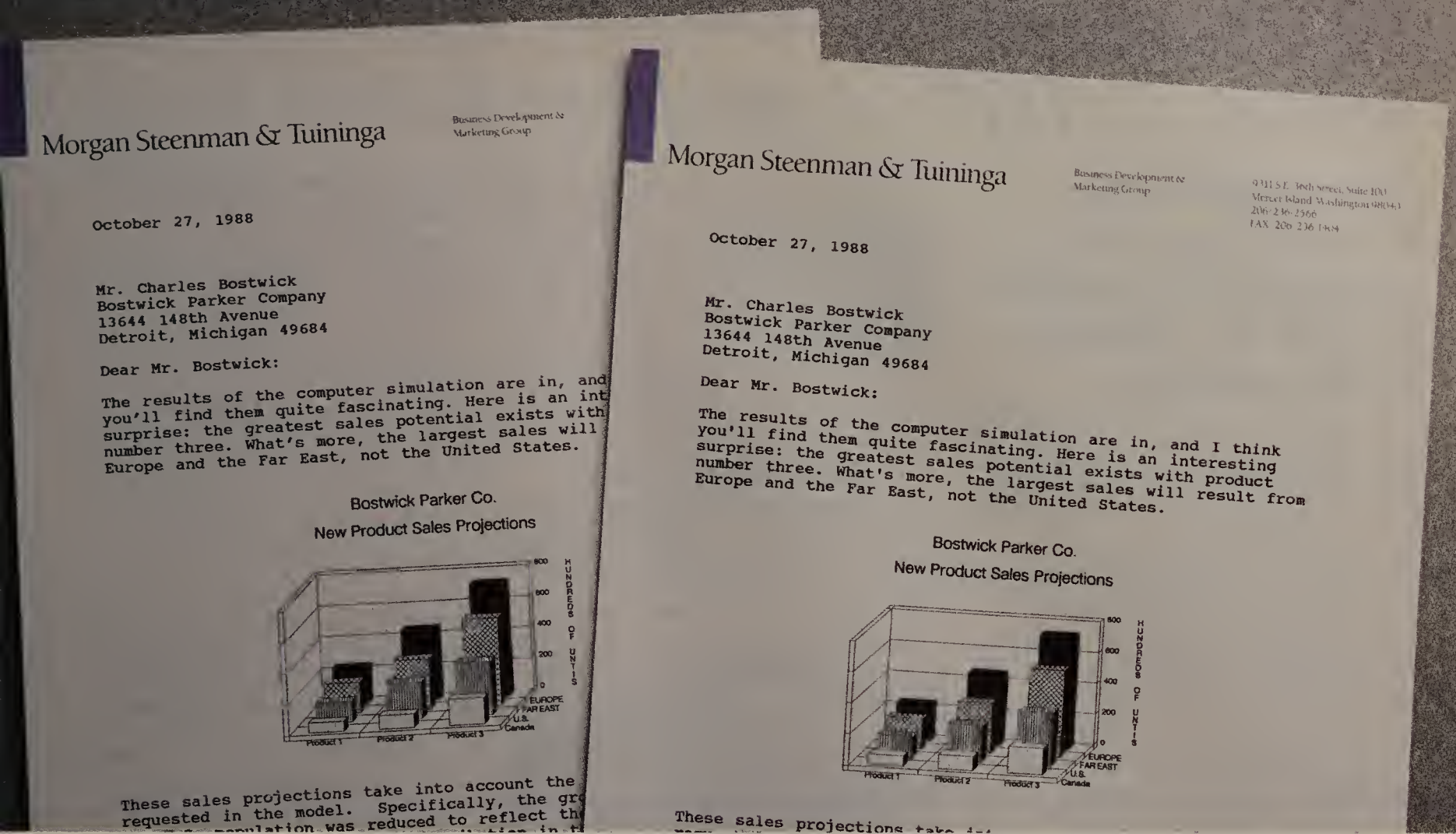
Tom Swan is a contributing editor for PC World *and the author of* Mastering Turbo Pascal 4.0 *(Howard W. Sams & Co., Indianapolis, Indiana, 1988) and the forthcoming* Mastering Turbo Assembler *(Howard W. Sams, 1989).*

To send correspondence or to submit material for publication in this column, please see How to Contact PC World, page 4. ●



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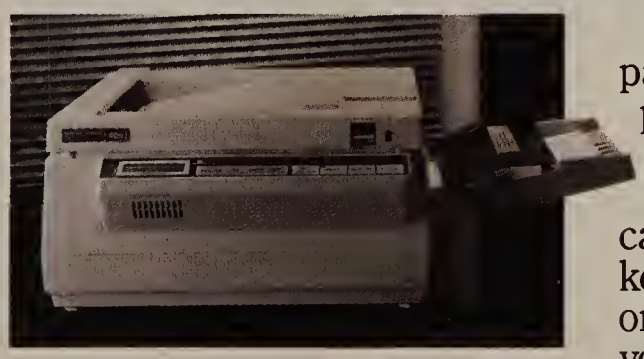

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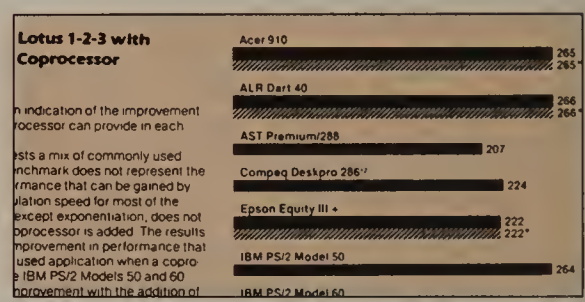

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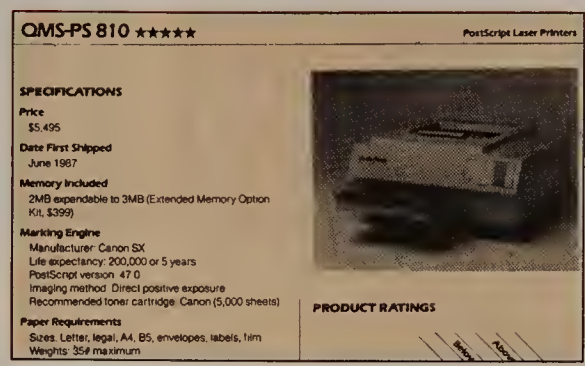
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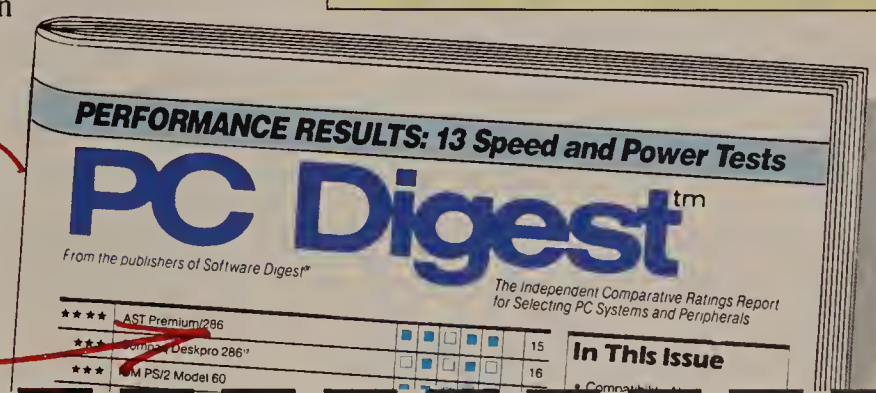

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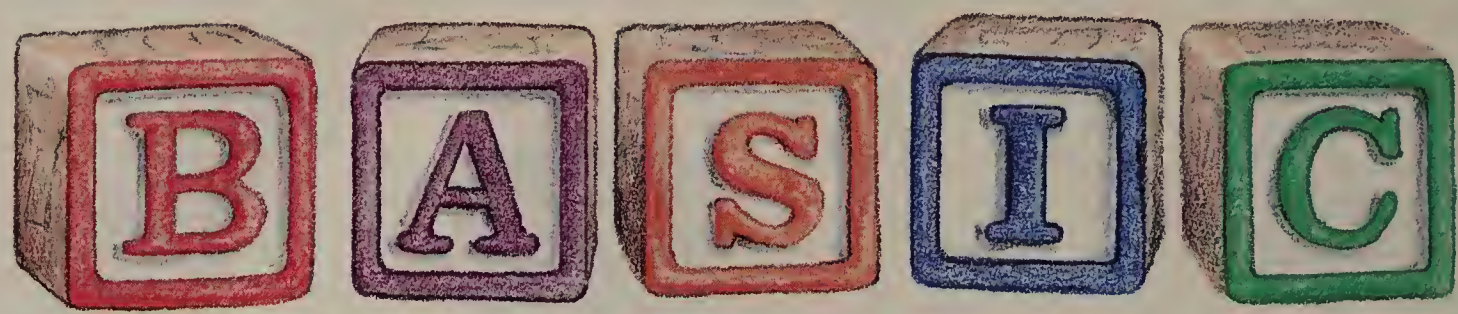

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NETWORK Q&A

Tips and strategies for departmental networking

Customizing a LAN operating system requires planning, training, and sweating the small stuff.

David Ferris

Q. *Our marketing department will be setting up its first LAN in a few months, and (lucky me!) I've been chosen as administrator. It will be a single-server Ethernet LAN running Novell's* NetWare, *linking 14 PCs and two LaserJets. We'll be running several multiuser applications, including a data manager, and we plan to set up an E-mail system.*

We have an installer coming in to lay the cables, and our dealer is formatting the server and installing the adapter cards, but beyond that I'm in charge.

Should I install the LAN operating system or should I hire an expert? How do I get up and running quickly without putting a drag on productivity?

George Camey
Kansas City, Missouri

A. If you can afford it, hire a *NetWare* expert to install your LAN operating system (LAN OS). The process is time-consuming and requires technical expertise. Yet, even if an outsider installs your LAN OS, the real work begins with you, the LAN administrator. You'll need to customize the multiuser environment for the particular needs of your department.

The key elements of launching a successful LAN are design, documentation, and testing. Many administrators give short shrift to LAN design, overlooking such critical issues as server directory structure and security access control. This neglect costs dearly later, when the structure must be redesigned.

One of the biggest productivity drains is the time users spend adapting to a multiuser environment. Developing intuitive menu-driven front ends and writing lucid documentation can save everyone a lot of time and trouble. You should also test every application rigorously to make sure it works with servers, adapter cards, printers, and other components.

So where do you begin? Here are ten basic steps toward a happy LAN:

Step 1: Go to school. As a LAN administrator, you should take three to five days of LAN OS instruction. Look for classes that cover server directory design, memory management, log-in scripts, multiuser applications, backup, archiving, and recovery.

Step 2: Design the system. Lay out the LAN server's directory hierarchy on paper (see **FIGURE 1**). The process is similar to organizing your PC's hard disk, but much more complex. Before you get started, poll the future LAN members. What files, programs, and peripherals do they need to share?

NetWare requires several basic directories, but you'll need many more. At the very least, the root directory will have a user directory with subdirectories for each user's personal files and directories for DOS, batch files, and applications. If your PCs have different configurations (for example, some with Hercules displays and others with EGA), you should create a workstation configuration subdirectory for each PC.

Your LAN blueprint should describe the access control for each directory: Is this directory read-only for some users and read/write for others? Who is allowed to update files? Organize users with equivalent access and update rights into user groups. Try not to overload each directory with too many subdirectories. If you already have the multiuser applications you plan to

(continues)

ANTHONY RUSSO

Typical Server Hierarchy

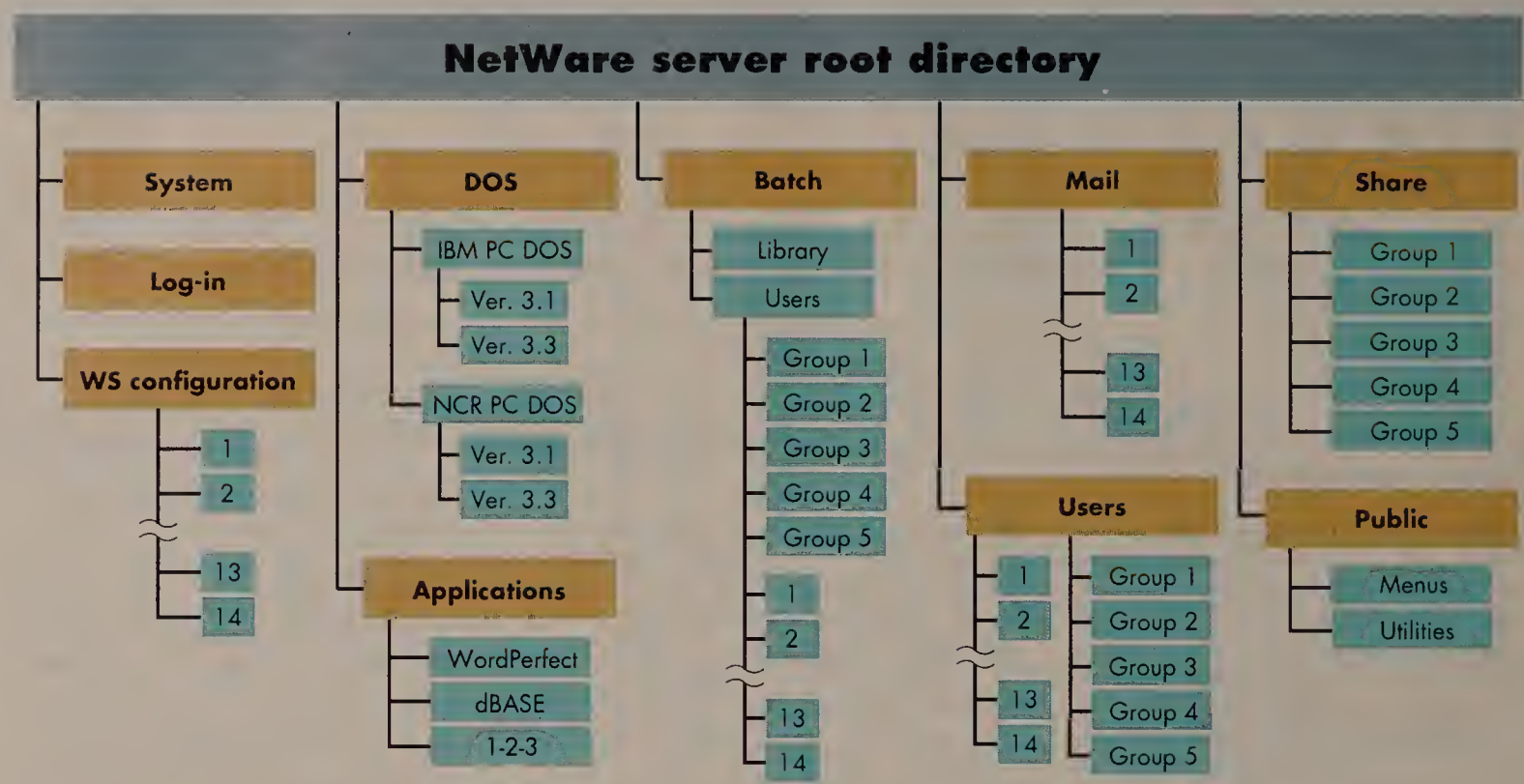

FIGURE 1: Before you begin creating subdirectories, sketch out your server's hierarchy on paper. Here's a broad outline for a typical NetWare server; the final version will be more elaborate, detailing access rights and showing additional subdirectories. The Share directory (where users can place files for public inspection) is organized into five subdirectories that correspond to user groups that share interests and access levels. The Workstation (WS) Configuration and DOS directories could be simplified if the PCs share the same components and DOS version. Batch is a library of utilities available to particular users or groups according to access rights, whereas Public holds utilities and menu front ends that are open to everyone. The Users directory holds each user's private work directory and, in this case, directories shared by specific groups.

install, check their installation instructions to make sure they jibe with your basic design; this can save a redesign later. Aim for perfection the first time, because changing the structure later will mean revising menu systems and batch files.

Step 3: Write log-in scripts. By now, the cabling, adapter cards, and LAN OS are installed, and it's time to put your paper plan to the test. Using *NetWare*'s Filer utility, define the server directories, user names, passwords, user groups, and access rights. Go ahead and define all your users, but for the first few weeks, you should hand out passwords only to a few savvy users. This testing staff can help you iron out bugs.

Next, write one or more log-in scripts using the SYSCON utility. Similar to DOS batch files, these specify what happens when someone logs in. A typical log-in script checks for waiting E-mail, notifies users accordingly, and sets up search directories similar to DOS PATH directories. If you've organized your LAN into user groups, you may want a separate script for each group. Otherwise write one master script and create a custom script for yourself and other special personnel.

Step 4: Plan a backup strategy. The server should be equipped with a 60MB to 150MB tape cartridge backup drive. Make sure the tape vendor's backup software works with both your drive and *NetWare*, and that it saves *NetWare*'s security data (known as the "bindery").

Now decide on a backup strategy. A typical game plan: Every day, save all files that have been altered, and once a week, back up the entire system. Keep four weeks' worth of backups, and every week recycle the oldest tapes.

Step 5: Install applications. Start with an easy program, such as a word processor or an E-mail package. Your main tasks will be creating the required directories, filling them with executable files, and developing a batch file containing setup instructions. Programs often force some unwelcome compromises. For example, some packages de-

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mand to save files in a directory containing executable code, even though it's best to define such directories as read-only. Other packages insist that you alter your server's entire structure. Usually, you have no choice but to acquiesce—or change applications.

Step 6: Keep on testing. Once you install an application, ask your testing staff to help you put it through its paces using all your peripherals. Getting your printers to work correctly is a common stumbling block.

No matter how hard you try, the best-laid LANs almost always require some tinkering. After you install each package, be prepared to change the directory structure and access rights, and to modify log-in scripts, user groups, batch files, and search paths.

Step 7: Install a data manager. Once the simpler applications are running smoothly, move on to a trickier program, such as a data manager. Make sure you have a true multiuser data manager that prohibits users from locking horns when updating records in the same file at the same time. Modify your existing data base applications with special multiuser commands included with your LAN-based data manager. These include commands that lock records, define time-out periods, and set field passwords.

Step 8: Set up batch files and menus. To shield users from arcane network commands, develop a good menu system that allows users to point to the options they want. These can be as simple as 'Run 1-2-3' and 'Switch to local printer', or as complex as 'Enter new purchase order'.

Plan the hierarchy of screens that will appear on the menus, and write some DOS batch files that define what happens when the user chooses an option. Then lay out the menus with a good menuing package that lets you paint the screen interactively. Buy a third-party menu package, such as Cybertek's *Pro Menu* or LAN Systems' *LAN Shell*. Avoid *NetWare*'s menuing utility—it's slow, buggy, and limited.

Step 9: Write the documentation. It's a good idea to train a substitute administrator who can step in while you're away. To make sure all goes smoothly, you'll

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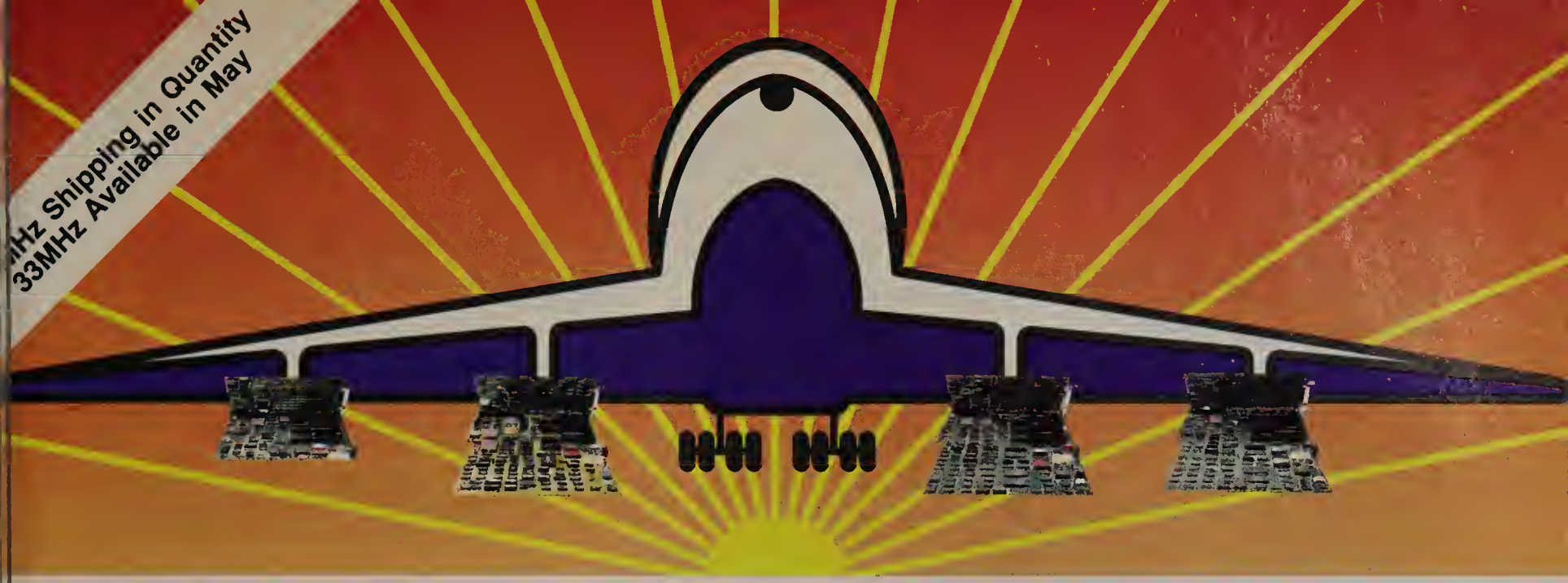

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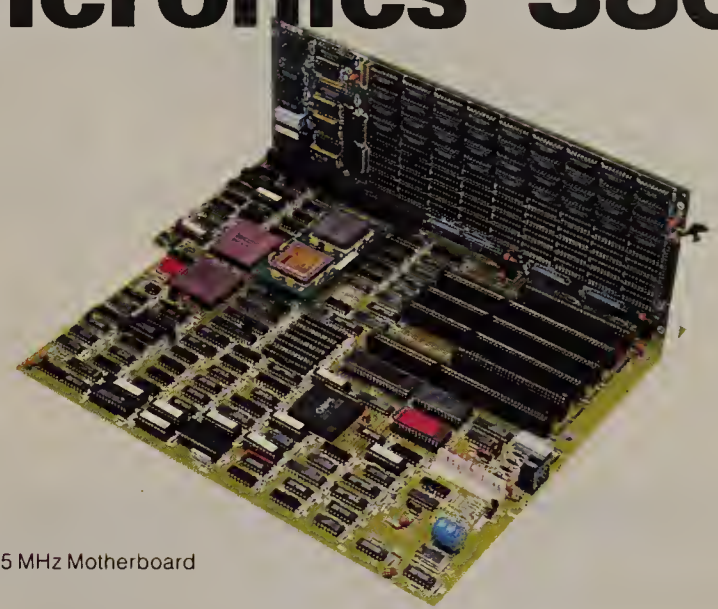

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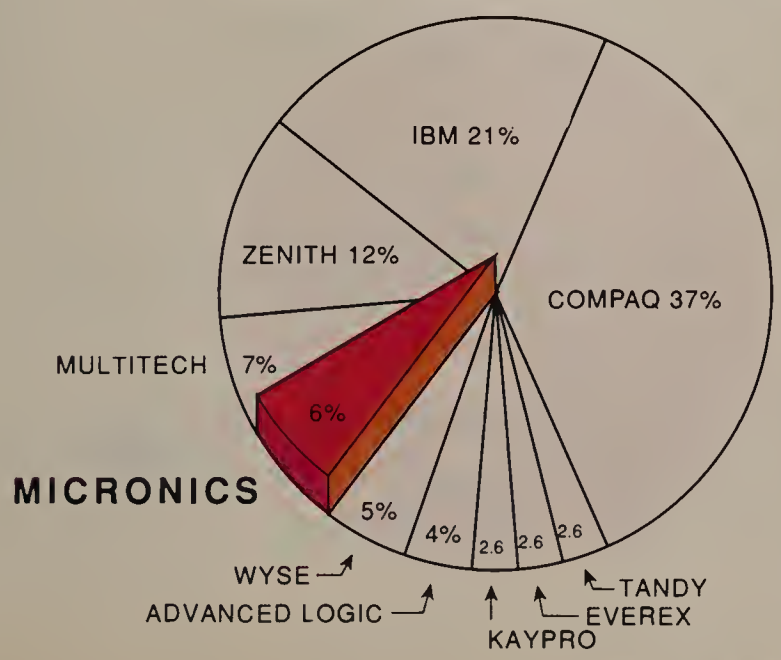

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need to document your day-to-day tasks. Describe the server's file structure, access control, user groups, backup regimen, menu system, and batch files. You should also detail the setup of each multiuser application. If your cablers haven't provided you with a map of the physical wiring of the LAN, draw one up.

Next, write documentation for the end users. Because you've designed most of the LAN environment, the *NetWare* manuals won't be much help. Cogent documentation will also cut down on the number of questions you'll have to answer every day.

A good user manual should start with such basics as how to log in and what to do if you forget your password. It should also cover menus, batch commands, printers, network utilities, and each application.

Step 10: Train the users. Once your LAN is set up and tested, prepare a few short classes for users. Schedule several hands-on sessions with novices.

And now, the moment of truth—bringing the users on line. Productivity will slow somewhat at first, so try to pick a slack period. The better you've prepared the LAN (and its users), the faster the office will get back to business as usual. ●

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David Ferris is the president of Ferris Networks, a San Francisco–based reseller of PC products and services, including systems configuration, installation assistance, training, and maintenance contracts.

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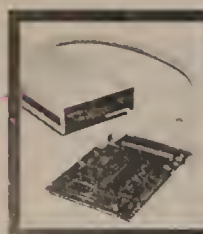

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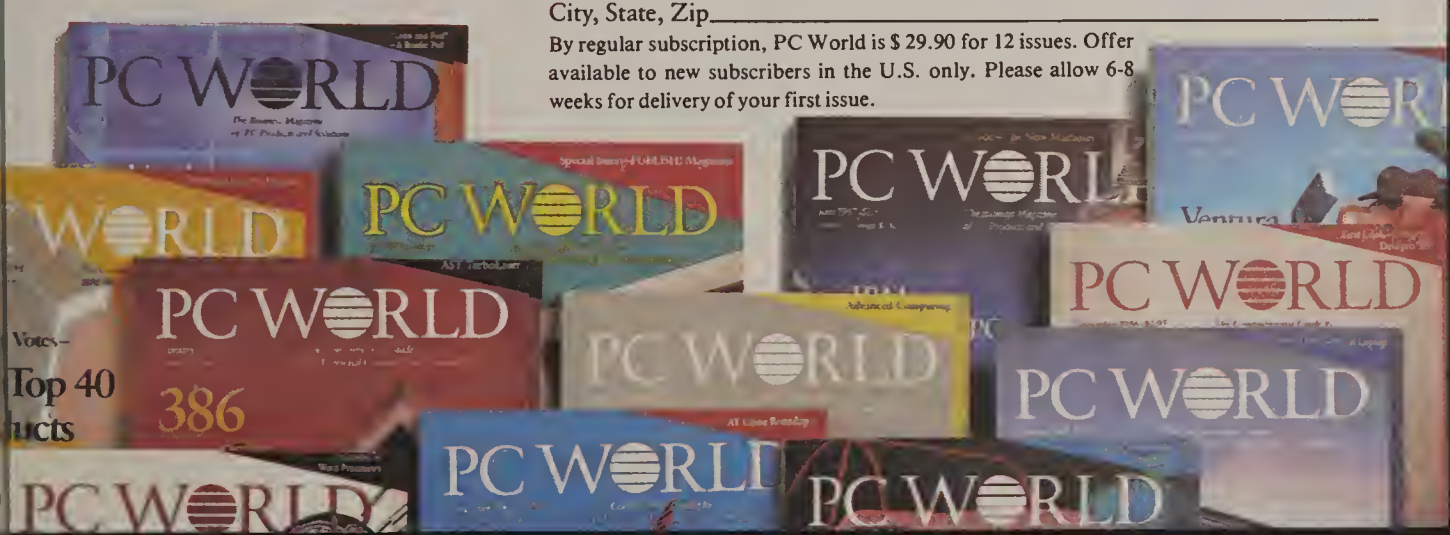

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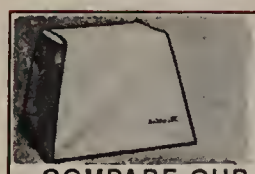

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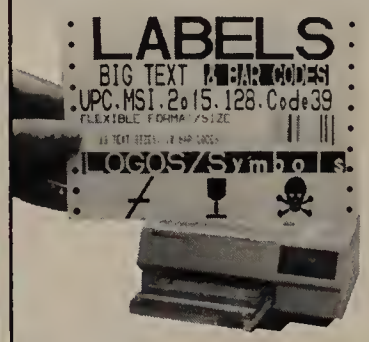

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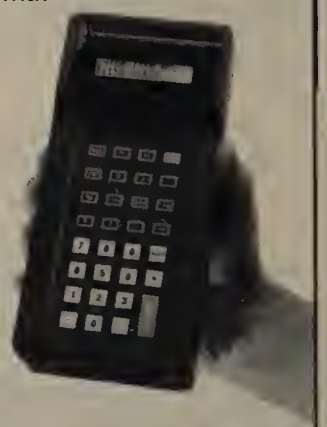

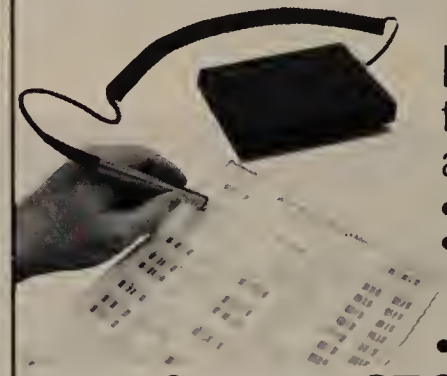

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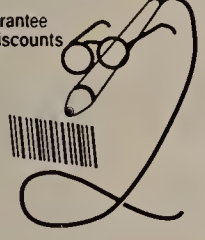

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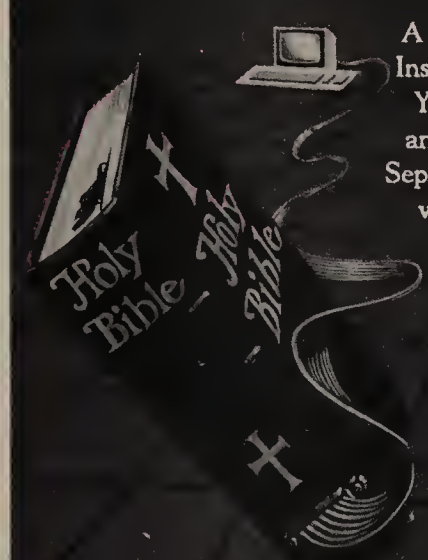

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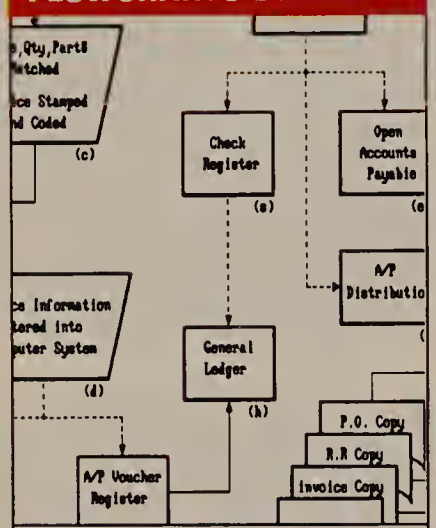

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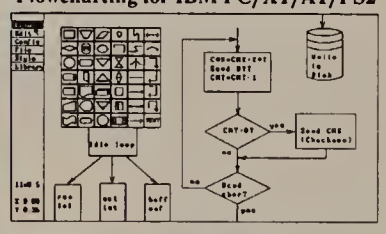

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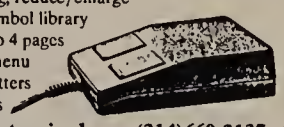

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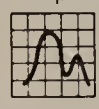

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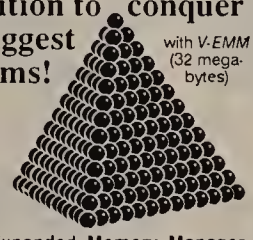

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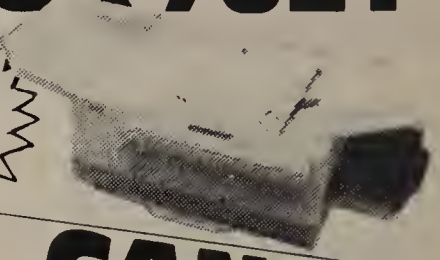

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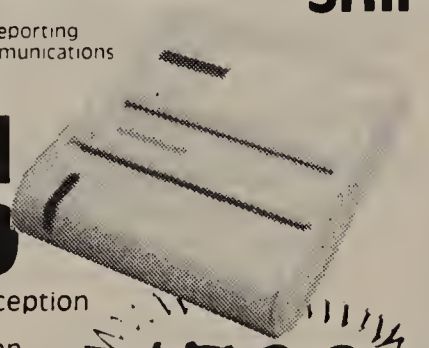

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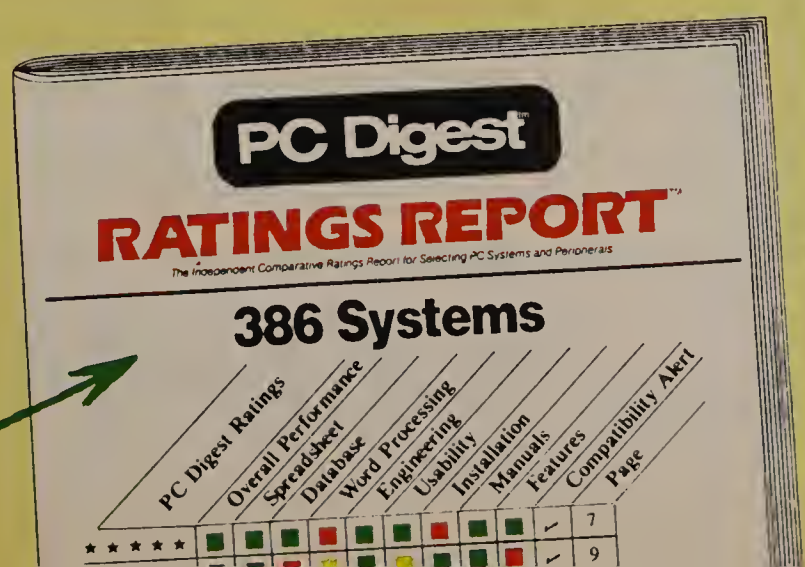

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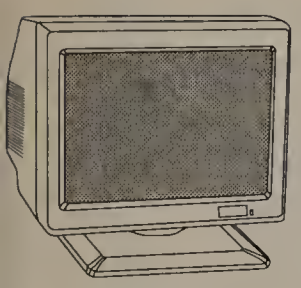

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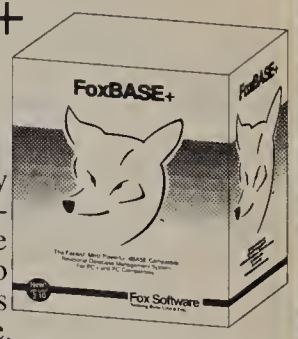

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2400B Int Modem	249	129
EVGA	499	249
Genoa		
Super EGA Hi-Res+	399	179
Super VGA #5100	445	239
Super VGA #5300	499	299
Super VGA #5400	699	419
Hercules		
Graphic Card +	299	169
Intel		
8087-2	250	139
80287-10	480	249
80387-20	730	449
Above Board Plus	795	395
Orchid		
ProDesigner	499	297
ProDesigner Plus	599	397
Tiny Turbo 286	445	269
Paradise		
Autoswitch 480	349	179
VGA Plus	399	255
VGA Plus 16	499	295
VGA Professional	799	479
Practical Peripherals		
1200B Int Modem	99	60
2400B Int Modem	199	149
Prometheus		
Promodem 2400B	199	129
Promodem 2400G	249	149

The Complete PC	LIST	FAST
Answering Machine	349	209
Fax 4800	399	225
Hand Scanner 400	249	139
USRobotics		
1200 Baud Internal	149	69
1200 Baud External	179	89
2400 Baud Internal	249	119
2400 Baud External	279	149
Video 7		
Fast Write VGA	549	335
Vega Deluxe	379	Call
Vega VGA	499	259
V-RAM VGA	799	469

LAPTOPS

Megahertz Modems		
2400B Toshiba	299	149
2400B NEC, Epson Mitsubishi or Zenith	399	199
Mitsubishi		
MP-286L Dual	3195	1879
MP-286L 20mb	4595	2449
NEC		
Multispeed EL II	2295	1449
Multispeed HD	3695	2249
Toshiba		
T1000	1249	759
T1000 768k Card	399	269
T1200F	2099	1369
T1200FB Backlit	2399	1499
T1200HB Backlit	3599	2399
T1600	4999	Call
T5100	7499	4495
Zenith		Call

MONITORS

	LIST	FAST
Magnavox		
7BM749 VGA	229	149
9CM082 VGA	649	419
Mitsubishi		
1409 RGB	399	259
1410 EGA	599	339
Diamond Scan 1381	799	479
NEC		
Multisync 2a	799	Call
Multisync Plus	1399	869
Princeton		
Max15	389	Call
Utltrasync	849	479
Utltra 16	1375	859
Seiko CM1430	995	599
Sony		
1302 Multiscan	995	659
1303 Multiscan	825	449
Zenith 1490	999	599

DISK DRIVES

Miniscribe		
40MB AT #3650	499	319
Mitsubishi		
40MB AT MR535 22ms	825	399
Seagate		
20MB XT Kit #225	599	267
30MB XT Kit #238	699	287
40MB AT #251	899	349
40MB AT #251-1	999	449
80MB AT #4096	1199	549
Toshiba		
360K Floppy	119	69
720K 3.5" Floppy	149	79
1.2MB 5.25" Floppy	149	79
1.44MB 3.5" Floppy	189	99

Call On Non-Listed Items

SOFTWARE

Database

	LIST	FAST
Clipper	699	399
DataEase	600	389
dBase IV	795	439
dBXL Diamond	199	105
Foxbase Plus	395	185
Foxbase Plus Lan	595	295
Paradox 3.0	725	459
RapidFile	295	179
Rbase for DOS	700	Call
Reflex	150	90
Q & A	349	199
Q & A Lan Pack	299	185
Quicksilver	599	329

Desktop Publishing

Byline	295	175
GEM Desktop Pub.	299	169
Pagemaker	795	Call
PFS:First Publisher	129	69
Publisher's Paintbrush	285	149
Ventura	895	489

Financial

Bedford Integr. Acct.	249	139
Computer Assoc. BPI		Call
DAC 3.0	99	59
DAC Payroll 3.0	99	59
Dollars & Sense	179	99
Managing Your Money	199	117
Peachtree Complete II	199	149
Turbo Tax 1040	75	42

Graphics

	LIST	FAST
Deluxe Paint II	105	67
First Graphics	129	Call
Freelance Plus	495	Call
GEM Artline	495	269
GEM Draw Plus	299	165
Generic Cadd Level 3	250	149
Graph Plus	495	299
Harvard Graphics	495	Call
Perspective Jr.	149	85

Integrated

First Choice	159	89
Works	149	89
Windows 286	99	59
Windows 386	195	117

Mice

Keytronics Serial or Bus	119	75
Logitech Serial or Bus	119	65
Logitech New HiRes	139	85
Microsoft Serial or Bus	150	95
Microsoft W/ Windows	200	129
OmniMouse Serial	89	39
PC Mouse II Serial or Bus	149	82

Power Protection

Curtis Ruby Plus	115	59
Datasheild 85	90	50
Datasheild 100	99	57

Programming

	LIST	FAST
Macro Assembler	150	89
Norton Guides (Specify)	100	58
Turbo Basic	99	60
Turbo C 2.0	149	90
Turbo Pascal 5.0	149	90
Quick Basic	99	60
Quick C	99	60

Spreadsheets

Allways	150	82
Excel	495	Call
Lotus	495	Call
Lucid 3-D	99	59
Quattro	248	149

Utilities

CoreFast	149	71
Desklink	170	95
Desqview	130	73
Fastback Plus	189	99
FastTrax	60	37
Formtool	95	54
Laplink Plus	140	75
MS-Dos 4.01	149	85
Norton Advanced	149	74
PC Tools Deluxe 5.1	80	37
SideKick Plus	199	119
XTree Pro	129	61

Word Processors

	LIST	FAST
Ami	149	89
Easy Extra	99	55
GEM First Word Plus	199	117
Grammatik III	89	49
Manuscript	495	Call
Multimate Adv. II	565	267
Professional Write	199	109
Rightwriter	95	47
Sprint	195	119
Q & A Write	199	109
Webster's Writer	60	47
Word	450	Call
Word Perfect	495	215
Word Perfect Library	129	60
WordStar Prof. 5.0	495	189

Call On Non-Listed Items

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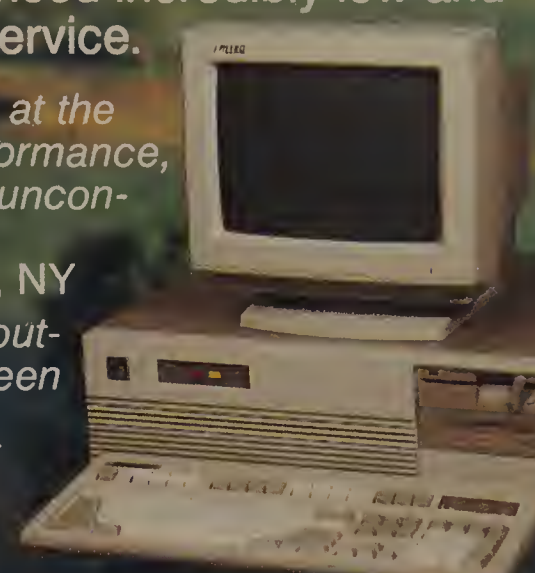
"Overall, I feel that your product is outstanding and your service has been excellent."
– Eric [illegible]gren – Stonington, CT



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2 Megs RAM
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[illegible] Meg 28ms SCSI Drive
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1 Parallel/2 Serial Ports
101 Key Keyboard
MS DOS 4.01

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10 Mbits/Sec DTR
16 Bit VGA Board
14" VGA COLOR Monitor
1 Parallel/2 Serial Ports
101 Key Keyboard
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(Call for 33 Mhz Option)

Steve Apiki & Stanford Diehl
Oct. 1988, **BYTE**
Review of 20 386

- *"Emerging as truly exceptional..."*
- *"The Gateway delivers speed without sacrificing features."*
- *"The system ran without a glitch."*
- *"We were truly surprised to see a system of this caliber selling for less than $3000."*
- *"When evaluating the whole package, The* **GATEWAY 386** *surpasses all the others!"*

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Circle 227 on reader service card

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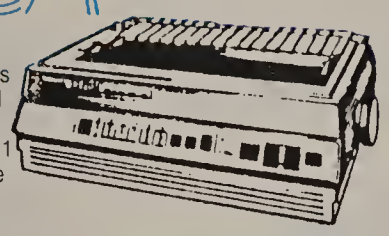
Panasonic Office Automation

KX-P1191

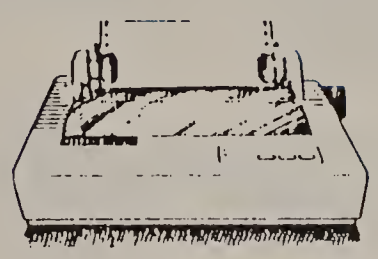
Announcing the Panasonic KX-P 1191, a 9 pin printer with advanced features that put it ahead of its class. The 1191 features the EZ-Set operator panel that lets you access the most commonly controlled printer functions right from the front panel. The 1191 has other advanced features, including an adjustable push pull tractor feed and multiple paper paths. All these features come packaged in a rugged, ergonomic design with a two year limited parts and labor warranty



$235.95

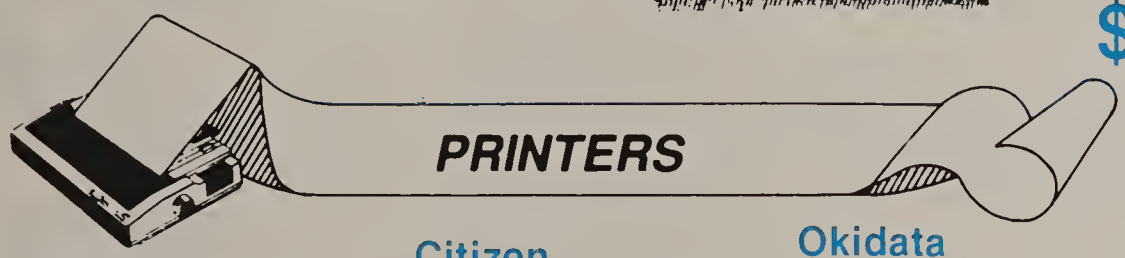
CITIZEN

Citizen 120-D



If you are seeking world renowned printer performance for your home, look no further than the 120-D. Your data processing needs are handled quickly at a print speed of 120 cps (NLQ). The 12-D features 9 pin dot matrix print quality, standard parallel centronics interface and a 4K text buffer.

$137.95



Seikosha

SP Series Ribbon	$7.95
SP 1200AS RS232	$189.95
SP 1600Ai	$179.95
SL 80Ai	$319.95
SK3000 Ai	$359.95
SK3005 Ai	$445.95
SL 130Ai	$599.95
MP5420FA	$999.95
SPB 10	$2995.95

BROTHER

M1709	$379.95
HR40	$599.95
Twinwriter6 Dot + Daisy	$899.95
M1724L	$569.95
HR20	$339.95
HR60	$699.95

Interfacing Available

Star Micronics

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NX-1000C (64C)	$169.95*
NX-1000 Color	$217.95*
NX-1000C Color (64C)	$225.95*
NX-15	$289.95
NX-2400	$279.95
NR-10	$319.95
NR-15	$419.95
NB24-10 24 Pin	$399.95
NB24-15 24 Pin	$545.95
NB-15 24 Pin	$669.95
Laser 8	$1699.95

** Limited quantities*

Toshiba

321 SL	$449.95
341 SL	$599.95
351 SX 400 cps	$899.95

Citizen

120 D	$137.95
180 D	$159.95
MSP-40	$279.95
MSP-15E	$325.95
MSP-50	$299.95
MSP-45	$379.95
Tribute 124	$369.95
MSP-55	$439.95
Premiere 35	$489.95
Tribute 224	$549.95

EPSON

LX800	$164.95
LQ500	$273.95
FX850	$329.95
EX800	$349.95
FX1050	$429.95
LQ850	$515.95
LQ1050	$719.95
LQ2550	$899.95
LQ950	$569.95

Okidata

Okimate 20	$139.95
Okimate 20 w/cart	$189.95
182	$209.95
180	$219.95
182+	$225.95
183	$239.95
320	$337.95
390	$469.95
393	$989.95

Printer Ribbons Available

Cables & Connections For All Applications

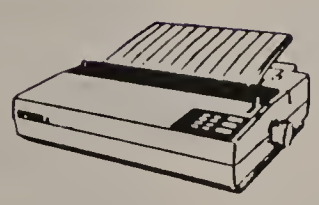
Panasonic

1180	$179.95
1191	$235.95
1092i	$289.95
1592	$359.95
1595	$429.95
3131	$289.95
4450 Laser	$1369.95
1524 24 Pin	$545.95
Fax Partner	$579.95
Optical Scanner	$859.95
1124	$319.95

EPSON

LX-800

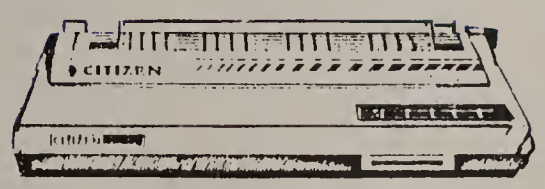
For fast output and professional print quality choose Epson's LX-800 This full featured 80 colum printer has a speed of 180 cps (draft) and 30 cps (NLQ). Epson's exclusive SelecType front control panel lets you customize dcocuments wuth popular type styles. The Epson LX-800 delivers affordable, professional printing for your home or office.



$164.95

CITIZEN

MSP-55



$439.95

When convenience and ease of operation is required in a 15" carriage printer, you'll look twice at the Citizen MSP 55. Citizen has set standards with 300 cps (NLQ), quiet mode operation, exclusive push/pull tractor and convenient soft touch control panel. For world class performance in your office, select the Citizen MSP 55.

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CITIZEN

Mate/12 $1349.95

World class competition in an 80286 PC AT from Citizen. One MB RAM is standard, along with 2 serial and 1 parallel port, EGA video card and keyboard switchable 6.25 12.5 MHz for full PC/AT compatability. Citizen also includes added features such as, switchable 150 watt power supply, 1 2 MB 5.25" floppy drive, MS-DOS-GW Basic software to provide for your immediate computing needs. Leave the competition behind with the Citizen Mate 12 plus.

Monitor Optional

FCC CLASS B APPROVED

Toshiba T-1000

Pick up on the T-1000 and you'll go far. Give yourself desktop PC power wherever you need it. Toshiba's T-1000 includes 512K RAM, one built-in 720KB 3.5" disk drive super-twist LCD display with CGA capability.

$799.95

MAGNAVOX 9CM-053

For full EGA capability, the Magnavox 9CM-053 should be your choice. This 14" CRT provides 690 H x 390 V resolution with text modes in both green and amber. Add to this a two-year warranty and you'll decide to stay smart with Magnavox.

$345.95

VENDEX

VTI-33-XT $719.95

- IBM XT COMPATIBLE WITH AWARD BIOS
- SMALL FOOTPRINT
- 8088-1TURBO PROCESSOR WITH 4 77 OR 9 54MHZ SOFTWARE SWITCHABLE
- 640K
- 2-360K FLOPPY DISK DRIVES
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- RS232 SERIAL PORT
- CLOCK CALENDAR WITH BATTERY BACKUP ON BOARD
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- CGA MGA AND HERCULES GRAPHICS ADAPTOR
- 6 TOTAL EMPTY SLOTS
- 135WATT POWER SUPPLY
- MS-DOS VERSION 3 3
- GW-BASIC

- Monitor optional

FCC CLASS B APPROVED

Seagate

ST138R 30 Meg Internally Mounted Card

- Premounted on its own Controller Card
- EZ Slot Installation (app. 10 min.)

$329.95

20-30-49 meg drives available!

LASER

Monitor Optional

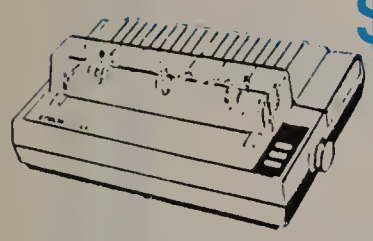
Turbo XT Model II $629.95

Out perform the conventional PC XT competition with Lazer's Turbo XT-II. The Lazer provides everything you expect from an XT plus such standard features as 4.77 10 MHZ speed, 102 key enhanced keyboard, security lock and a clock calendar with battery backup. Lazer's compatability is guaranteed through a 150W power supply, four accessable drive slots, (1 360K 5.25 standard) 8 I O expansion slots, parallel centronics and RS 232 interfaces, 640K RAM standard, (expandable to 1.6 MB) along with a CGA video card already installed Introduce yourself to the new generation XT through Lazer's Turbo XT-II.

FCC CLASS B APPROVED

EPSON

LQ-500 $273.95

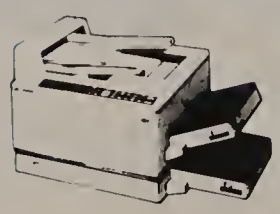


For a 24 pin dot matrix printer that offers high performance and remarkable value, Epson sets the standard with the LQ-500 The LQ-500 is at home whenever you need high resolution text or graphics combined with high-speed operation. An 8K buffer SelecType control panel, pull tractor and parallel interface will allow the LQ-500 to expand to meet your growing needs

Panasonic

Office Automation

KXP4450 Laser Partner



Move your business in the laser age with Panasonic. 512K memory comes standard. 11 pages per minute print speed makes it the fastest in its class. Panasonic's laser technology and 2-year warranty—commitment to your printing needs.

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star micronics

NX-1000 RAINBOW

$217.95

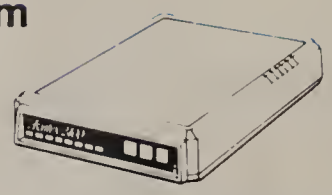
Color Printer!

The Star NX 1000 Rainbow adds a whole new dimension to your work through multi-color printing. Star has designed 20 printing options into this printer. Add to this paper parking, Epson-IBM emulation, high resolution NLQ graphics for a printer with extra talent over the competition. Let Star's NX 1000 Rainbow do all the work. You just have to collect the praise.

1-800-233-8760

2400 Modem

Avatex™

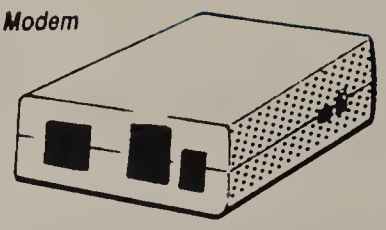


- Auto/manual Originate or Answer
- Auto Speed Select in Originate/answer Mode
- RS-232C Interface
- 2-Year Warranty

$129.95

Avatex™ 1200P

Pocket Modem



- Pocket Size
- Plugs Directly to RS 232C
- Battery Charger Included
- 12V DC Power Adapter
- 2-year warranty

$89.95

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MODEMS

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1200p	$89.95
1200hc Modem	$89.95
2400	$129.95
2400i II PC Card	$129.95

US Robotics

Courier 1200	$169.95
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Courier 2400 PS	$259.95
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Hayes

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Goldstar

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2105A Composite	$79.95
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1430 VGA	$379.95
1440 Superscan	$459.95

Magnavox

7BM-613	$79.95
7BM-623	$79.95
CM8702	$179.95
CM8762	$239.95
9CM-515	$259.95
9CM-053	$339.95
9CM-082	$439.95

NEC

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- 720 K
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- Universal Installation Kit Included
- Full Manufacturers Warranty

$84.95

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ST 225N 20 meg SCSI	$289.95
ST 238R 30 meg RLL	$225.95
ST 251 40 meg 40MSECMFM	$339.95
ST 251 40 meg 28 MSEC MFM	$399.95
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ST 277N 64 meg SCSI	$439.95

3.5:"

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ST 125N 20 meg SCSI	$334.95
ST 138R 30 meg RLL	$249.95
ST 138N 30 meg SCSI	$329.95
ST 157R 49 meg RLL	$389.95
ST 157N 48 meg SCSI	$439.95

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SR-4053 40 meg 28 MSEC MFM	$469.95
ST-4096 80 meg 28 MSEC MFM	$575.95
ST-4144R 122 meg 28 MSEC RLL	$679.95

Seagate Internal Cards

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St 157R 49 meg Internal Card	$485.95

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MFM Controller (XT)	$59.65
RLL Controller (XT)	$64.95

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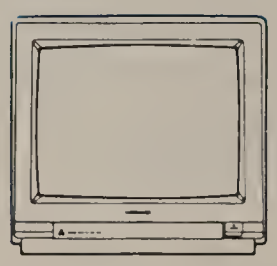
Citizen Mate/12	$1349.95
BCC CG ColorCard	$94.95
ATI VIP	$299.95
Everex Micro Enhancer	$189.95
EGA-Grace	$189.95
Paradise Basic EGA	$189.95

GoldStar

1440 Super

$475.95

Goldstar, a solid performer in Computer electronics, now introduces the 1440 Super Scan monitor The 1440 is a 14" multi-scan monitor which supports a high resolution of 800H x 560V A .31mm dot pitch with non-glare surface and TTL or Analog sugnal are standard features.



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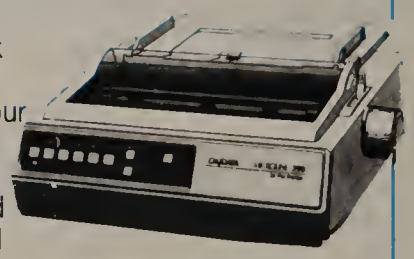

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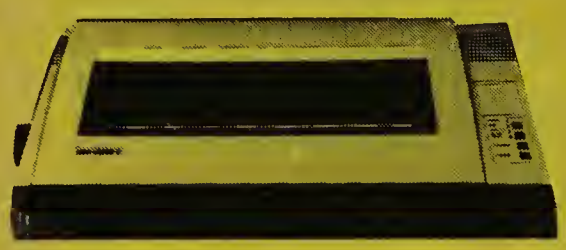

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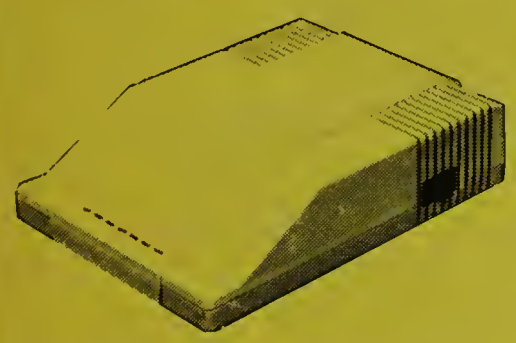

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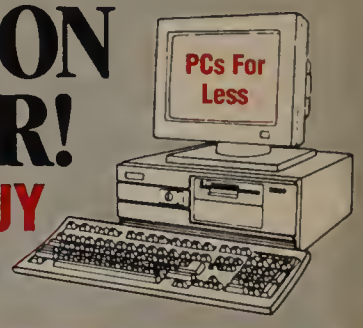

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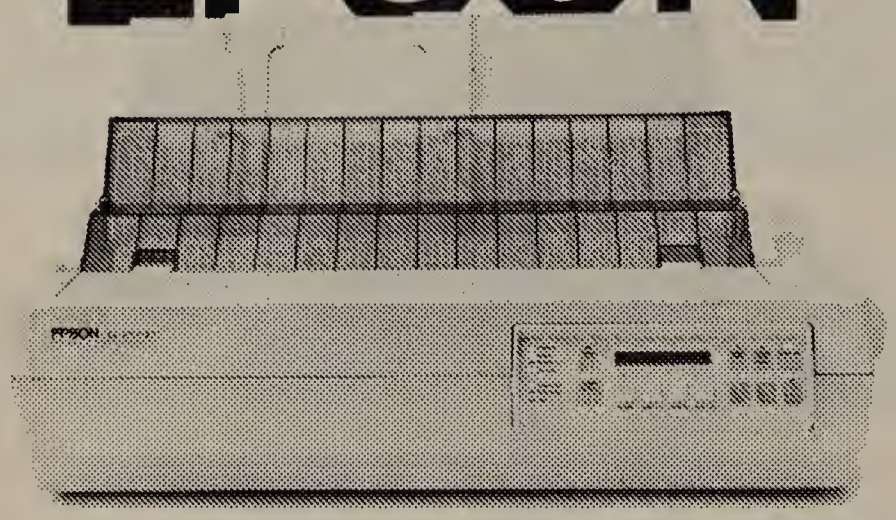

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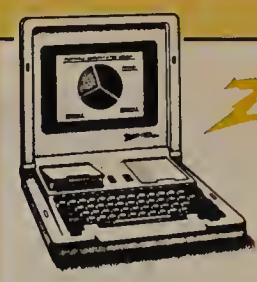

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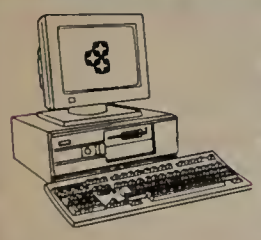

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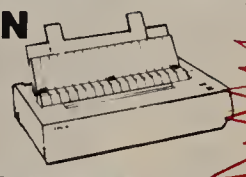

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The Tool Doesn't Make the Artisan

Francis X. Bolton

I've just read my mail so I can relax—at least until tomorrow's delivery. Then I will once more face the prospect of opening a letter or a flyer created by a desktop publisher.

If tomorrow's mail is like today's, it will be an amalgam of seven pieces of clip art and ten typefaces—an extravagant display of bold and italic type parading across the page, drawing attention to nothing at all. As I wad it up and loop it toward the wastebasket, it's small comfort that desktop publishers currently lack the full panoply of publishing tools.

I have nothing against software tools that allow the novice to do something new—or to do something that formerly required professional help. After all, I use my computer to prepare my taxes *sans* accountant, although I run a small printing and design business.

But I don't fancy myself an accountant and haven't set myself up in business as a tax preparer. Just because I bought a tool that lets me do a job that once cost me a small fortune, I don't bill myself as an expert in that field.

The craft does not reside in the tool, yet for some reason would-be desktop publishers don't seem to appreciate that.

Granted, I've met many with solid backgrounds in graphic arts who use desktop publishing software to lower costs and improve their efficiency and aesthetic control. Still others attend seminars and read extensively, and are genuinely open to suggestions.

But judging from the material that finds its way into my mailbox, there are plenty of amateur desktop publishers who forget that the word *design* has several meanings, one of them being "deliberate planning."

Maybe that's a little harsh; it isn't as though those mediocre desktop publishers are deliberately planning mediocrity. They simply don't know any better. But many apparently feel that since they know how to write and have seen fliers or newsletters all their lives, they should be able to put them together themselves.

To add to the problem, most desktop publishing tutorials fail to offer the kind of help they could. Generally, they tell the reader how to do something (choose a column width for a newsletter, for instance) with little or no explanation of the judgments on which such decisions are based. Such instruction may help with the job at hand but not necessarily with the next one—for the simple reason that each publication is different.

So what's the solution? Software developers and book and magazine publishers should improve the instructional level of their material. In particular, they should give the novice designer fewer how-to's and more how-comes. Even experienced designers may benefit from being reminded of the fundamentals of graphics, and of the traps that we all fall into when we get forgetful or lazy.

If you're new to desktop publishing and lack a background in graphic arts, begin reading things from a design perspective. Critique your junk mail, study print advertisements, and subscribe to traditional graphic arts periodicals.

Most of all, remember that you're learning your craft in public. Every poorly designed piece you create is there for the whole world to see. And it may end up in my mailbox. ●

Francis X. Bolton is president of the New York PC User's Group and a printer by trade.

Have a different perspective? Write Dan Lavin, User Ombudsman, PC World, *501 Second St., San Francisco, CA 94107.*

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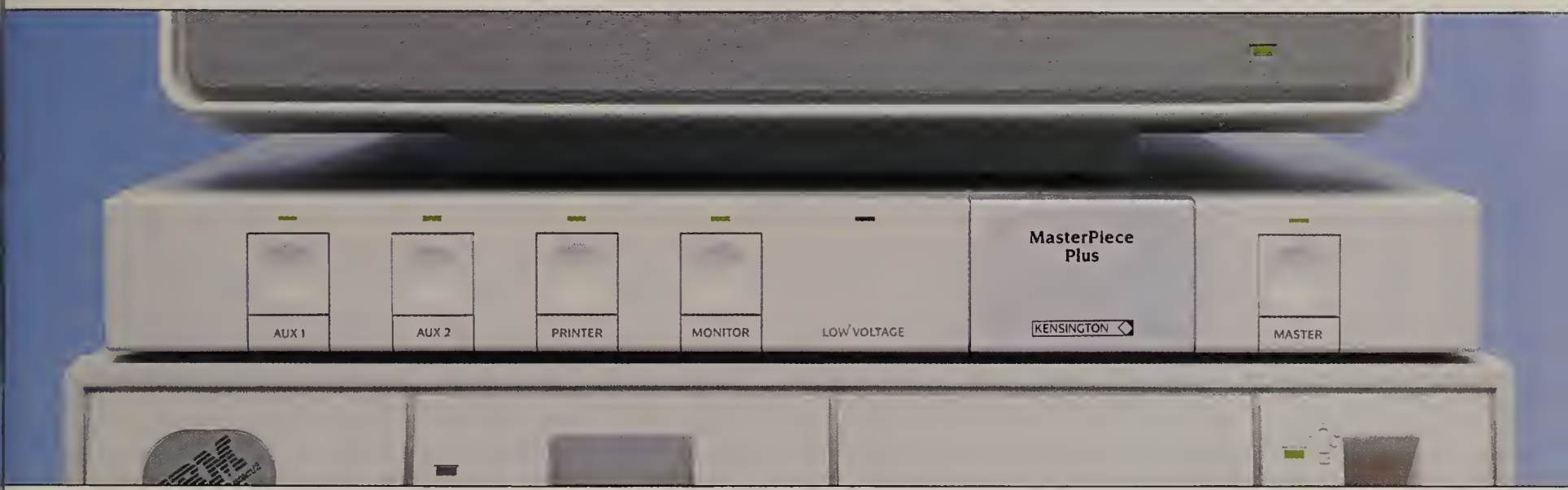

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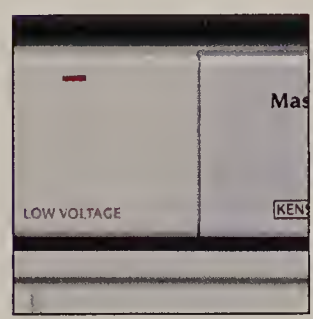

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